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Oh et al.

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(54) **MOBILE TERMINAL**

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H04M 1/02 (2006.01)

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USPC 345/204–214, 690–699; 455/566, 455/575.1–575.8
See application file for complete search history.

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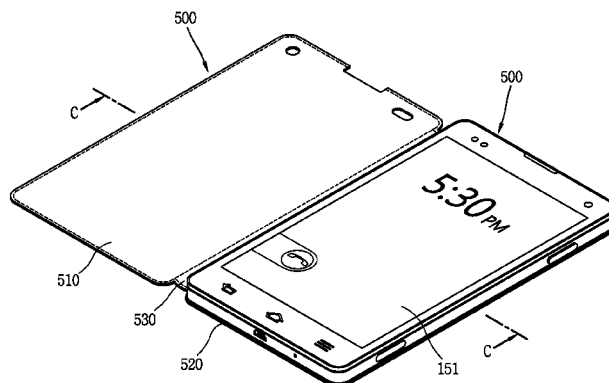
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(57) **ABSTRACT**

A mobile terminal includes a terminal body including a display unit formed on one surface thereof, a cover coupled to the terminal body such that it can be converted into a closed state in which the display is covered and an opened state in which the display unit is exposed, a signal generating unit configured to generate a state signal according to the closed state and the opened state, and a controller configured to control the display unit such that the display unit is activated in the opened state on the basis of the state signal.

17 Claims, 17 Drawing Sheets



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FIG. 1

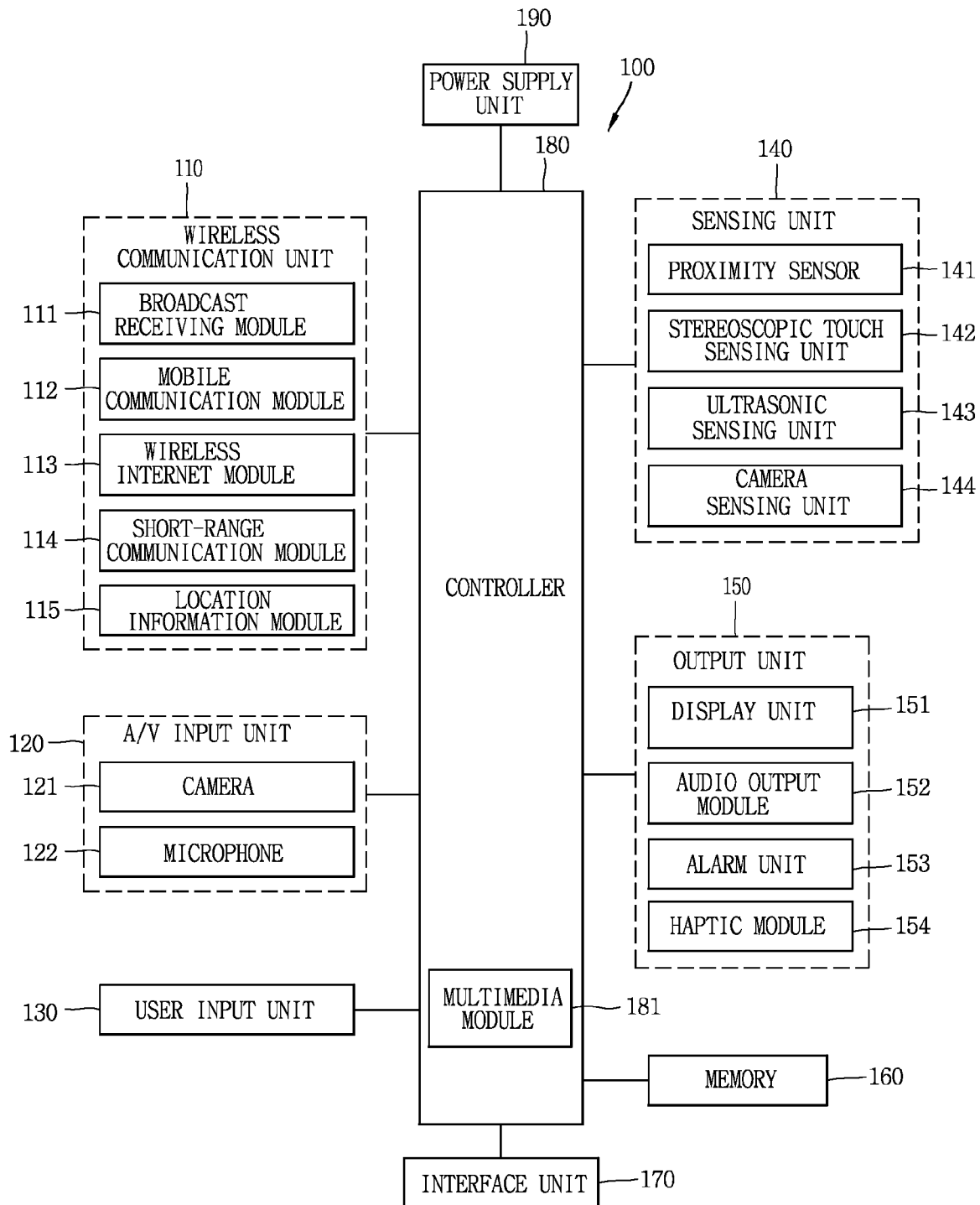


FIG. 2A

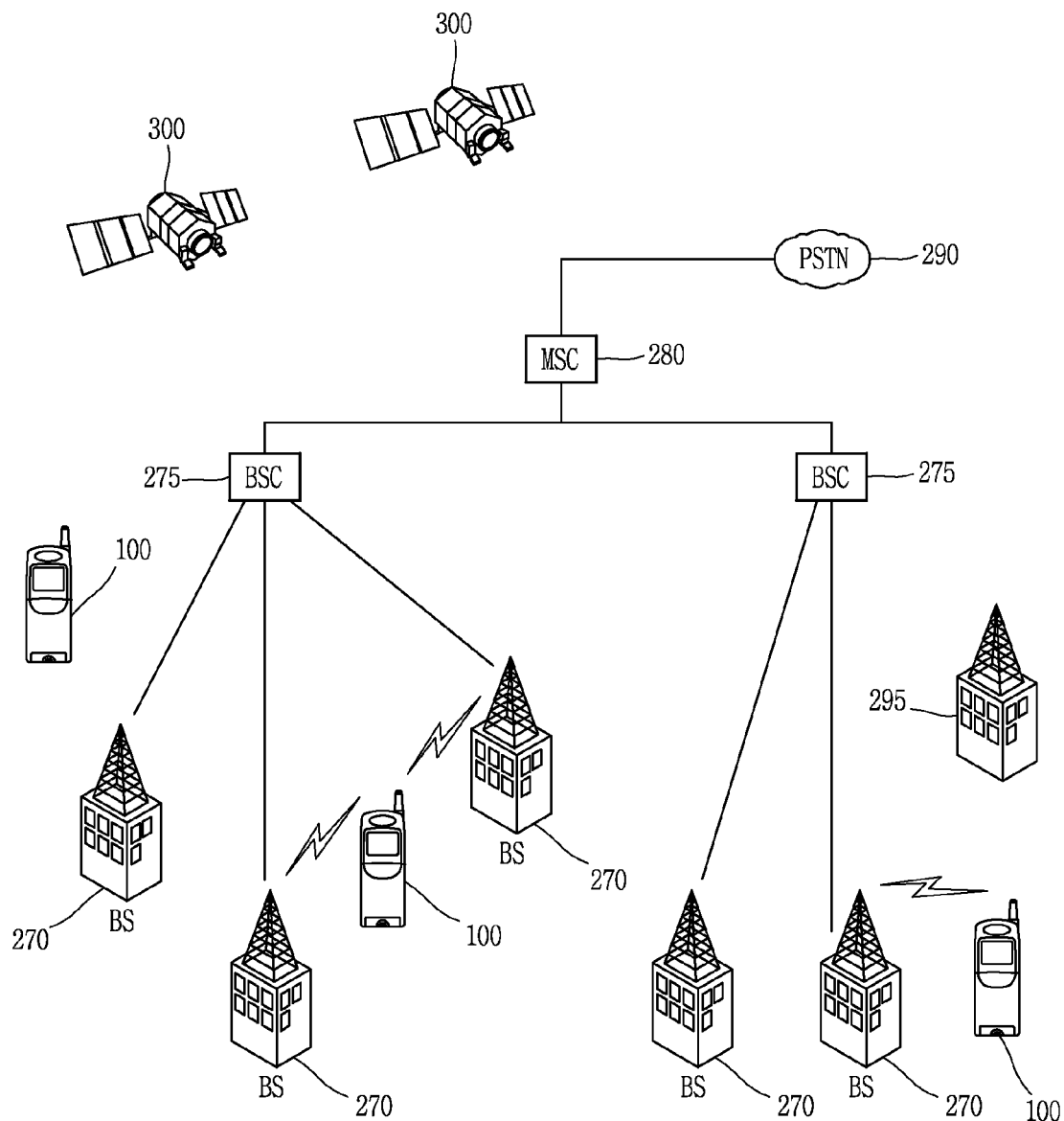


FIG. 2B

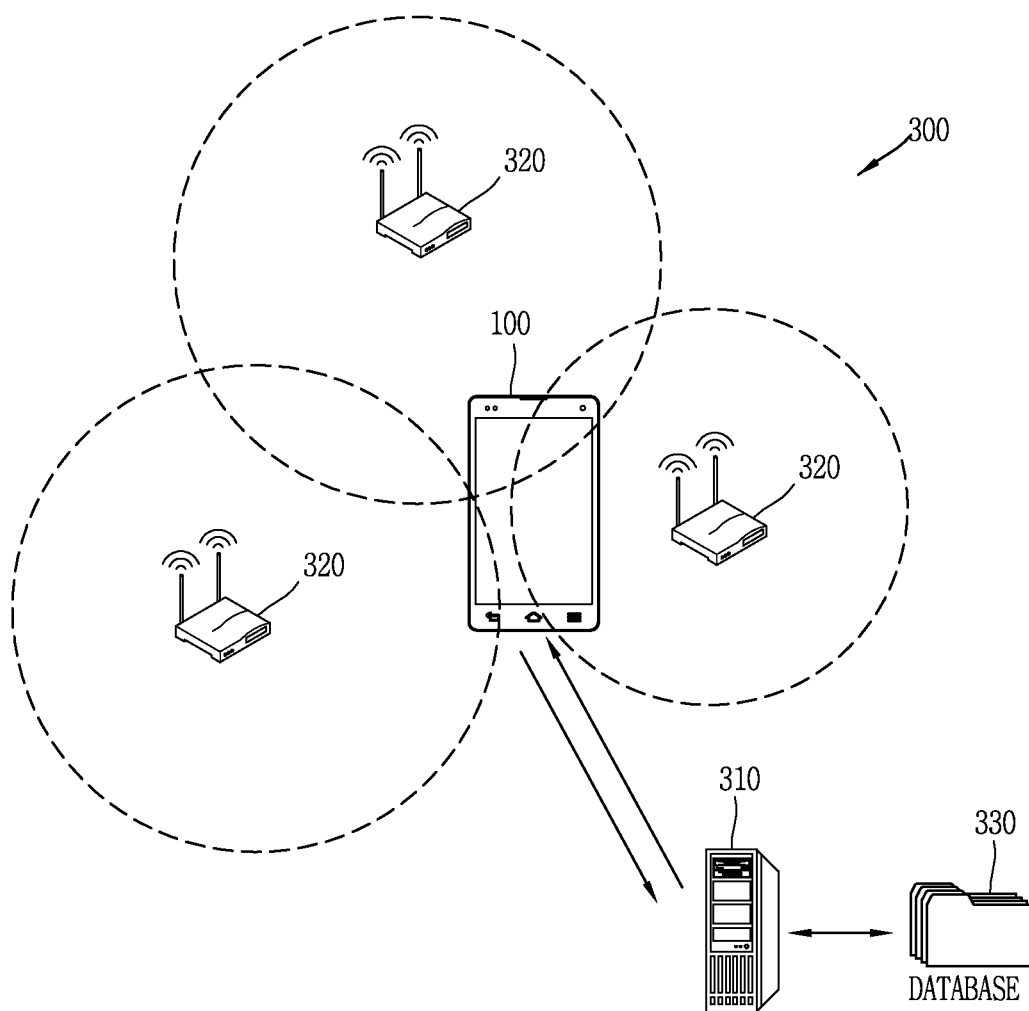


FIG. 3A

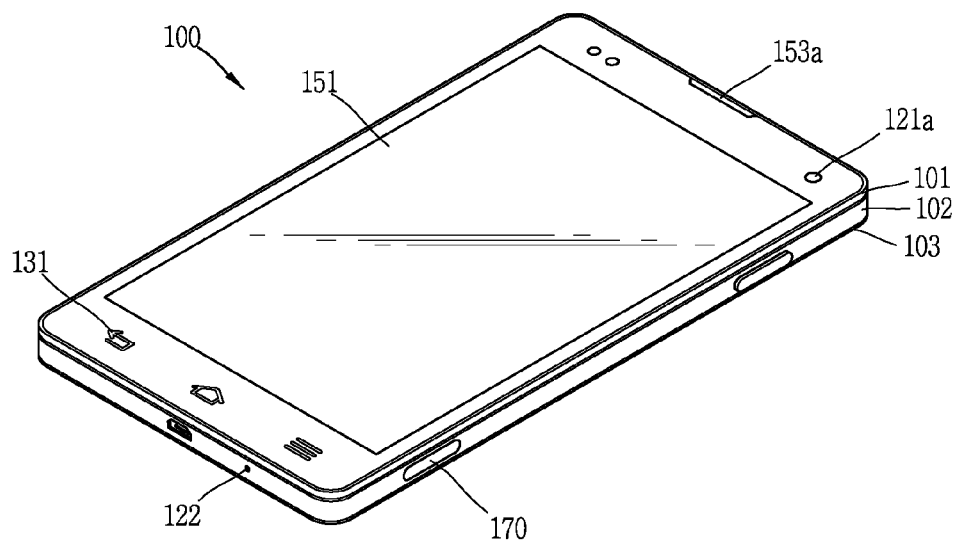


FIG. 3B

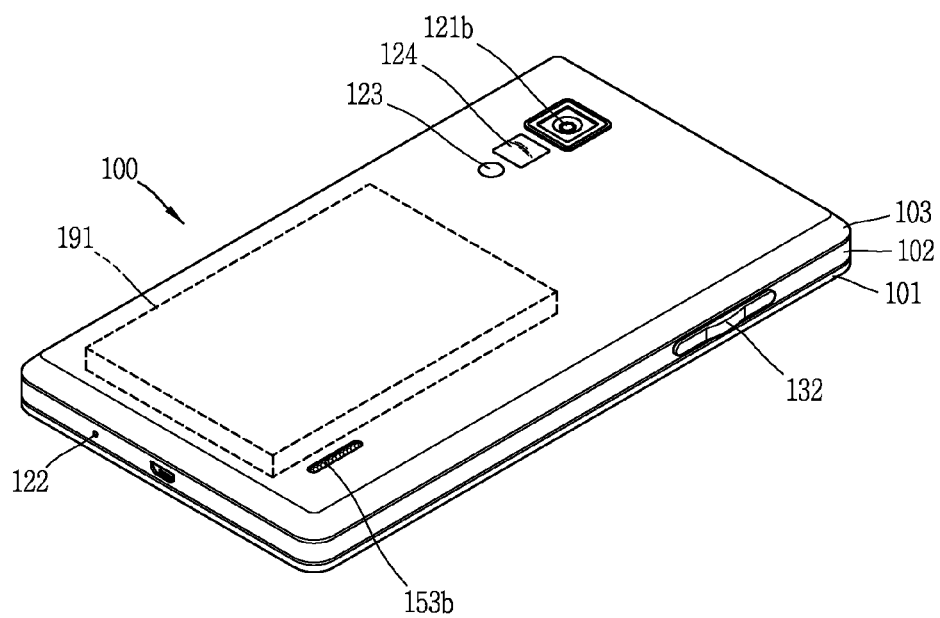


FIG. 4

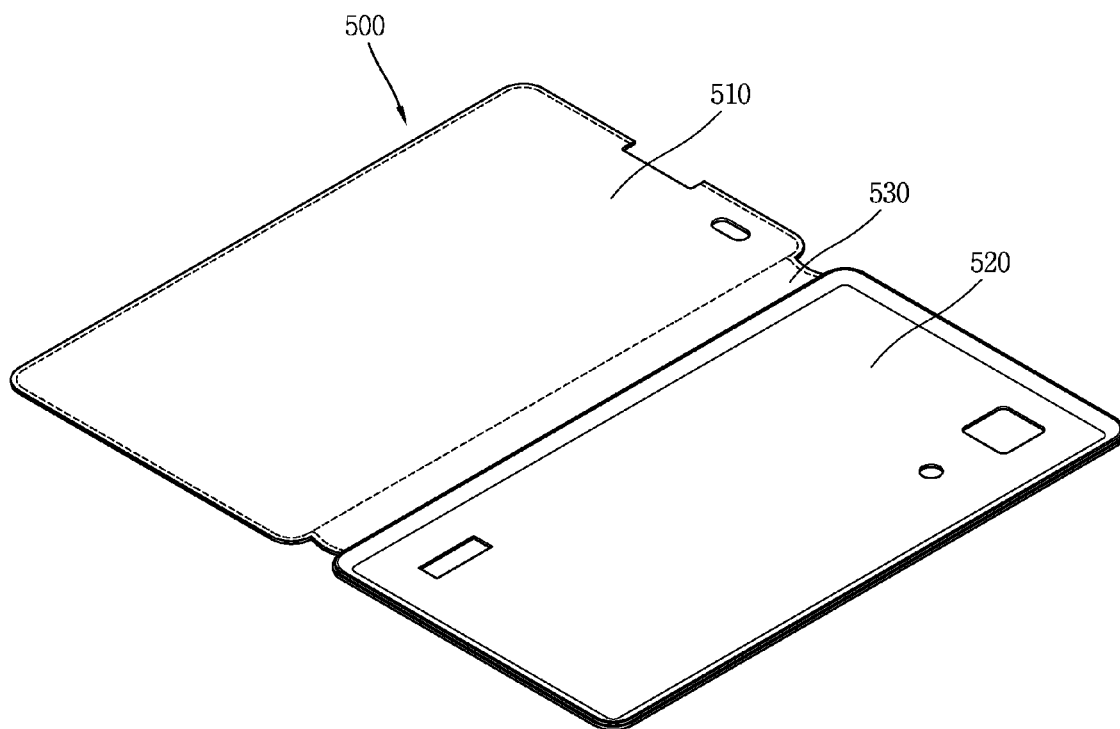


FIG. 5A

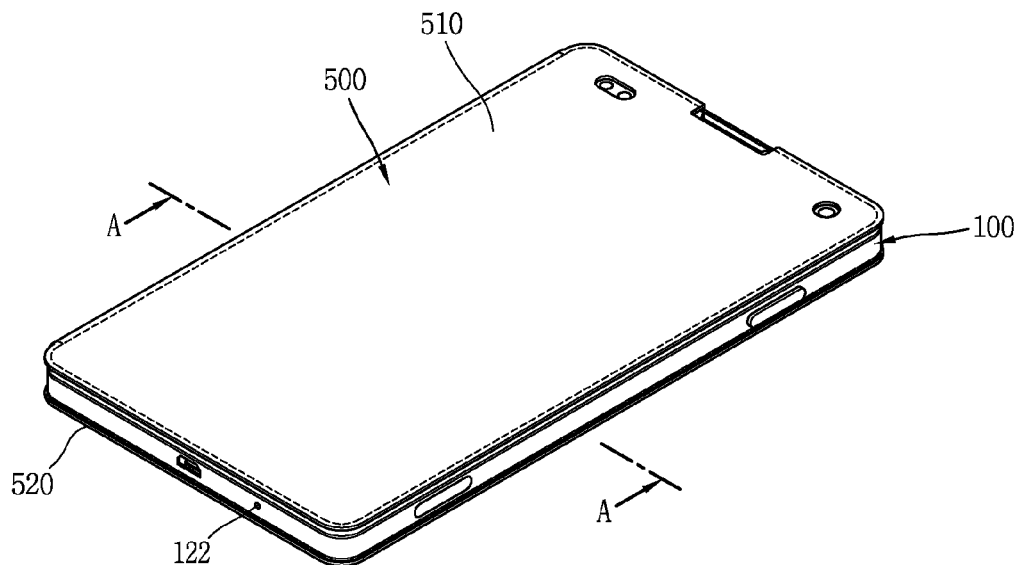


FIG. 5B

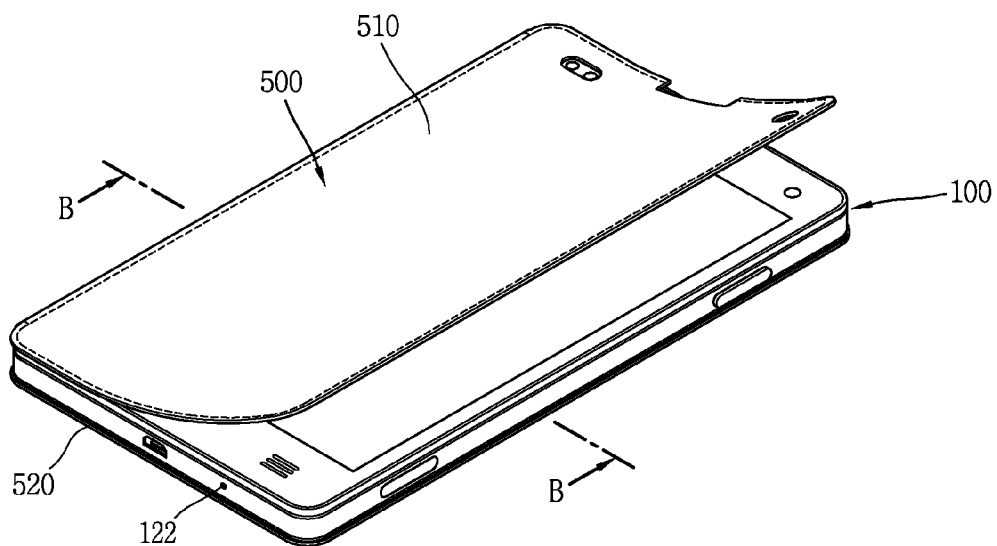


FIG. 5C

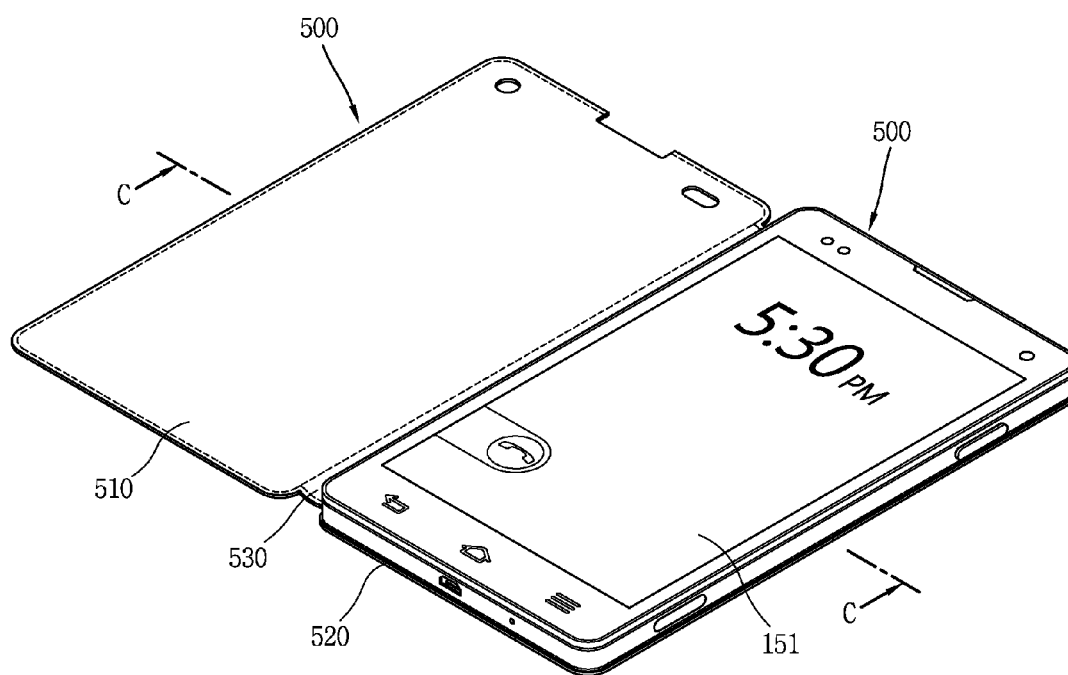


FIG. 5D

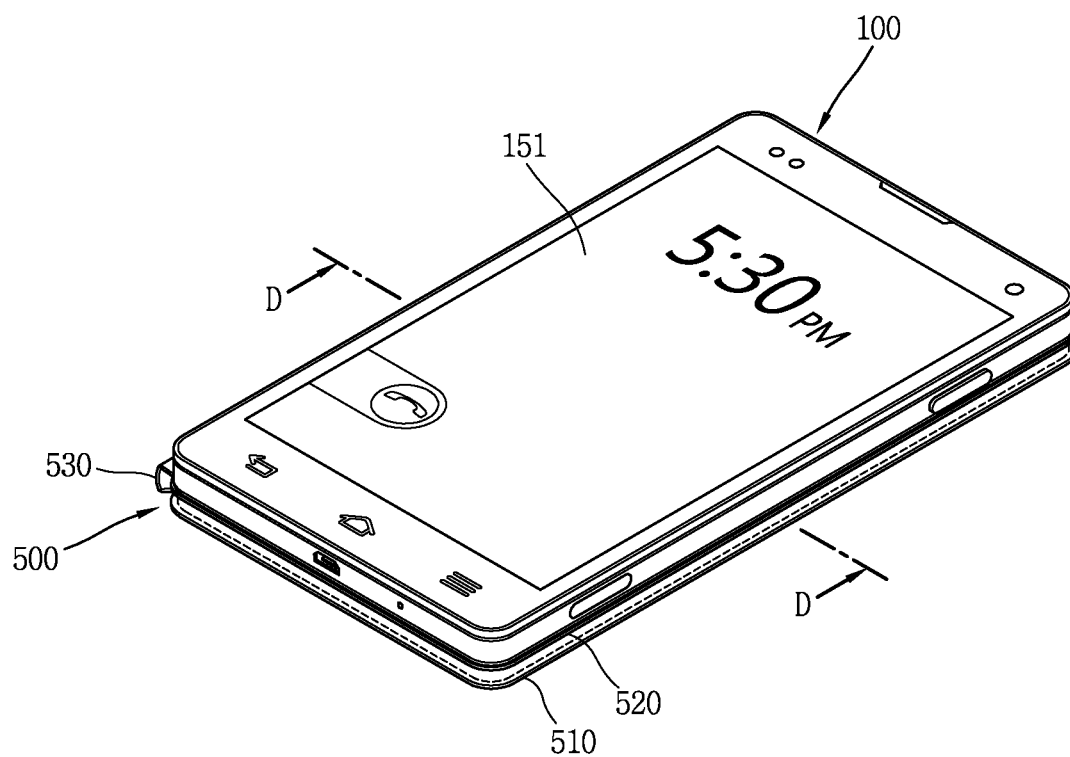
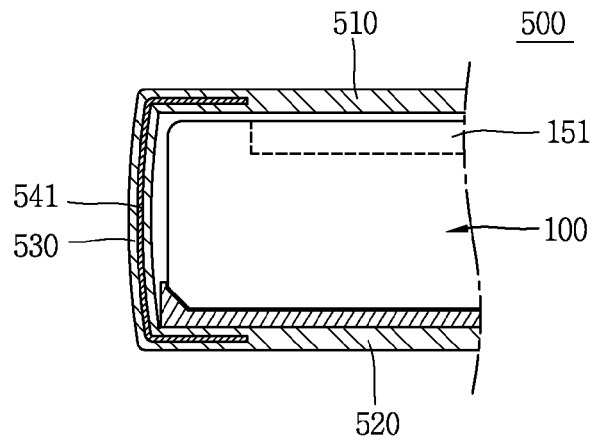
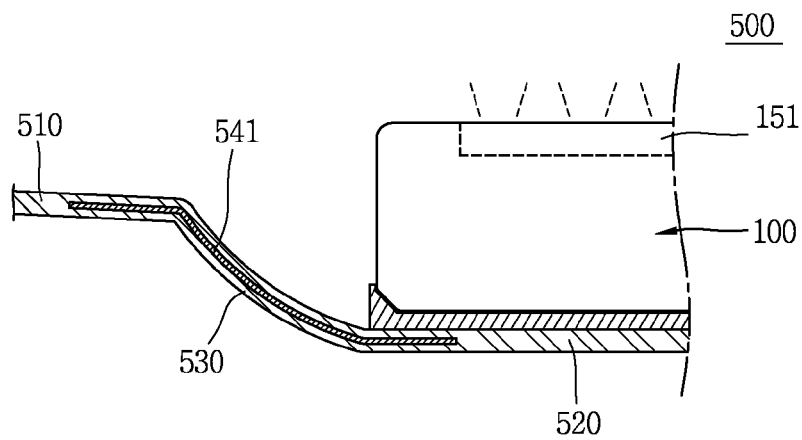


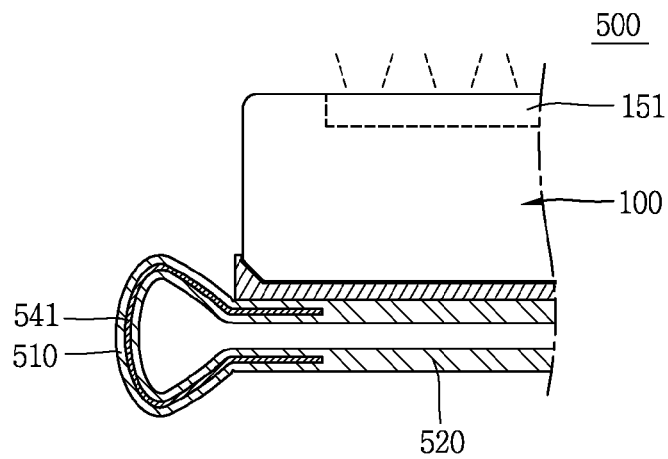
FIG. 6A



(a)



(b)



(c)

FIG. 6B

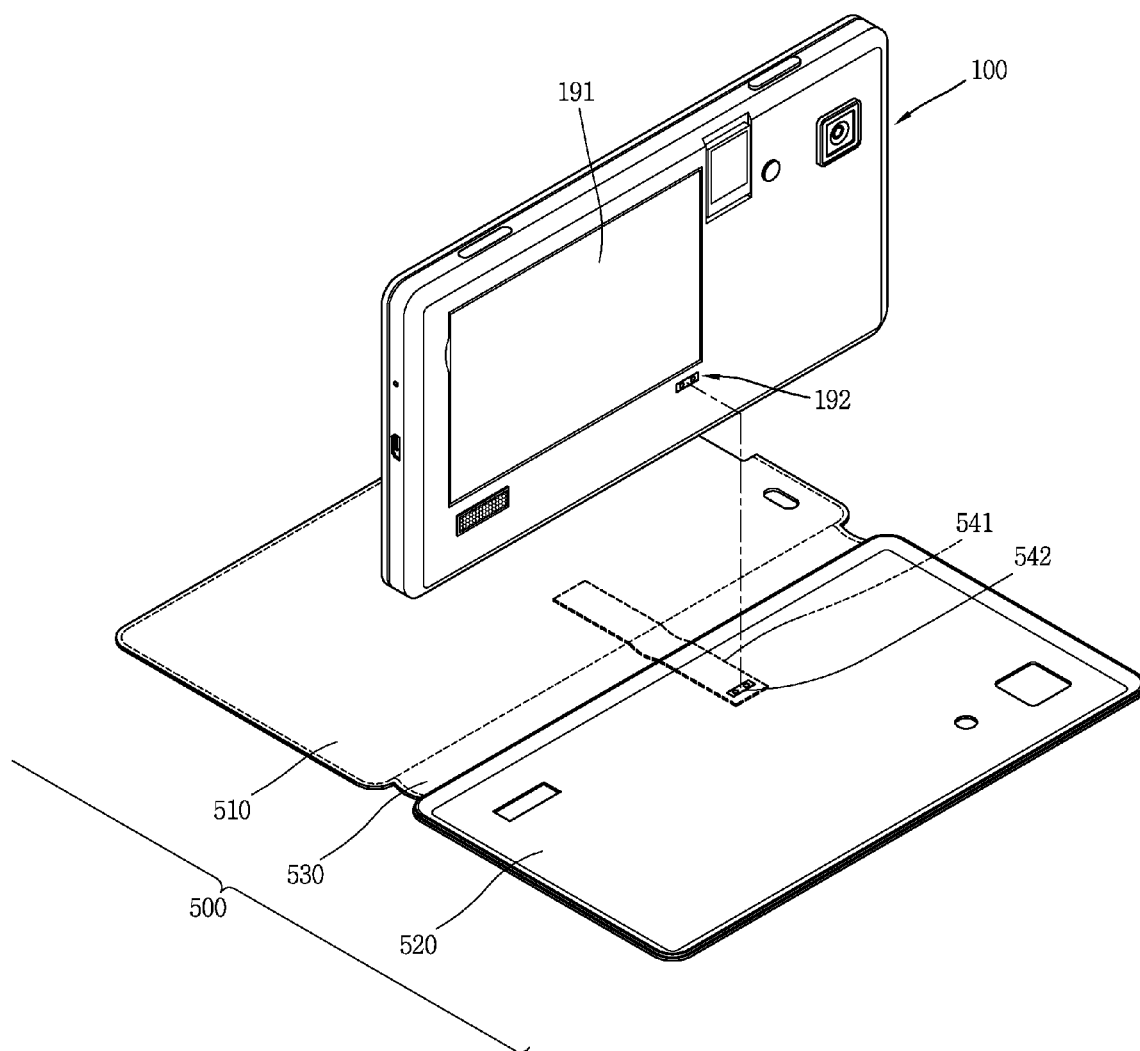


FIG. 6C

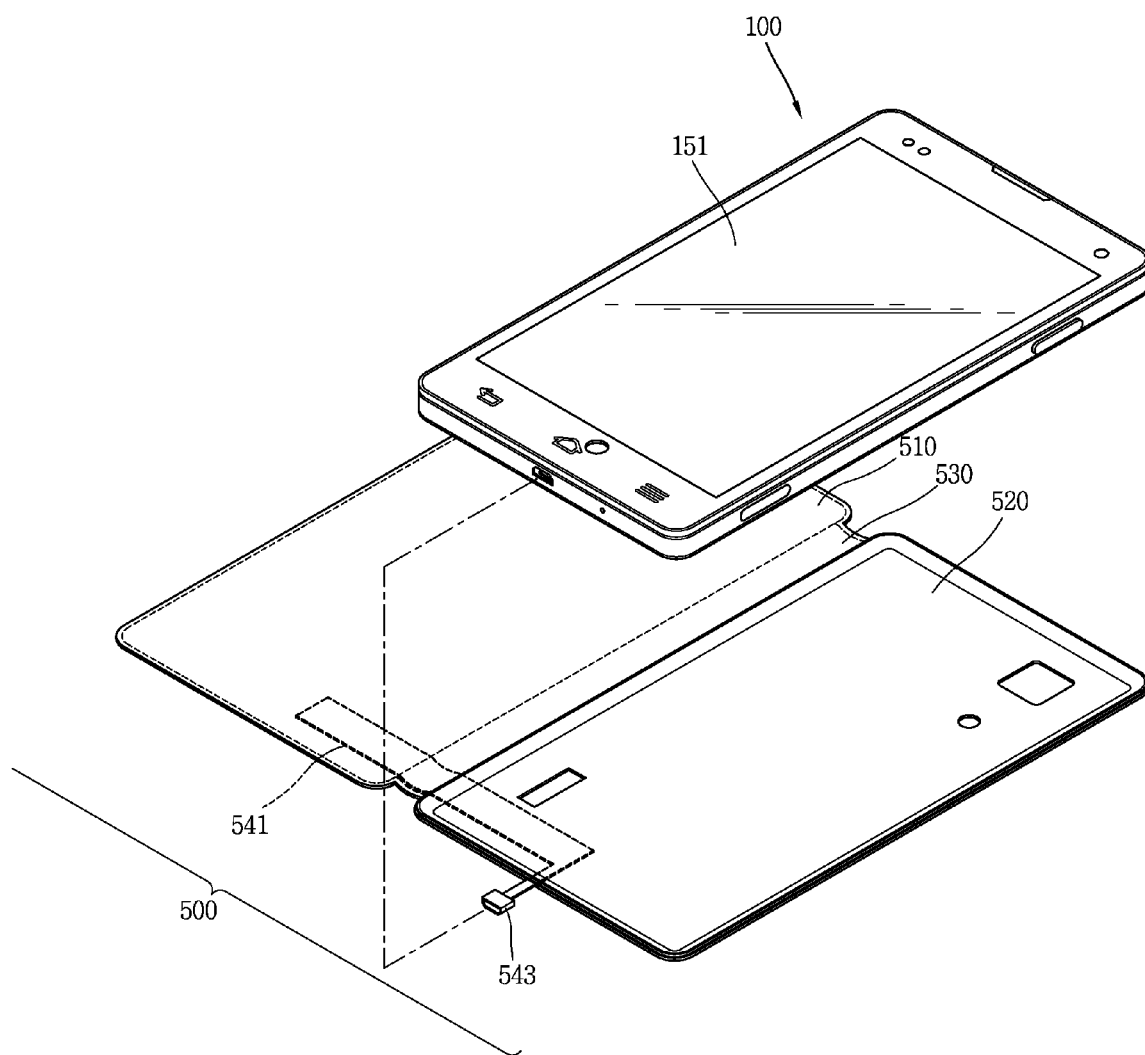


FIG. 7A

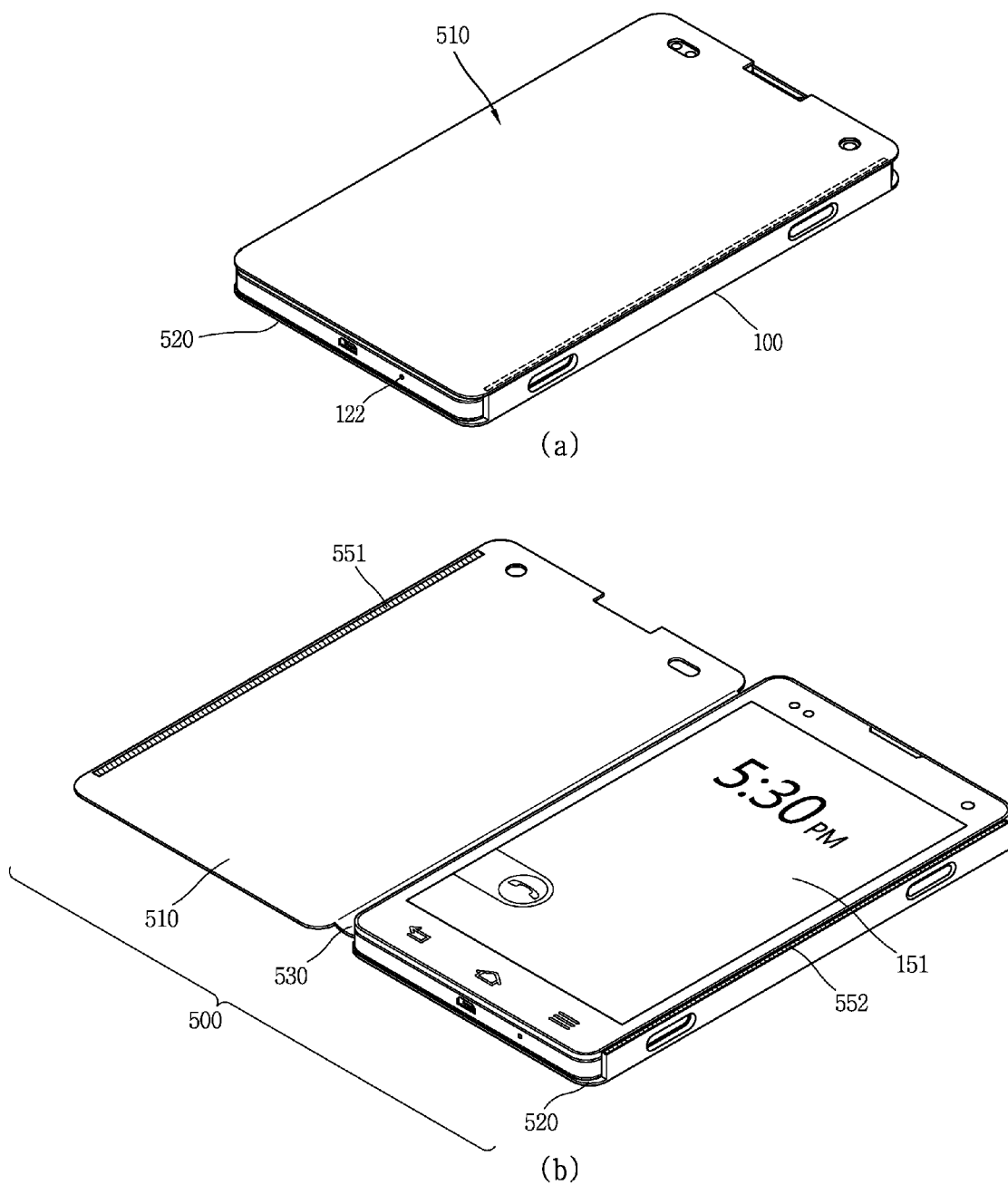


FIG. 7B

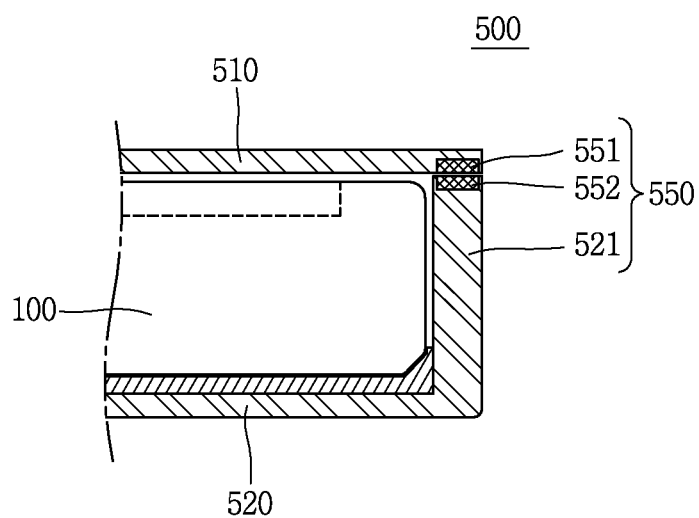


FIG. 8

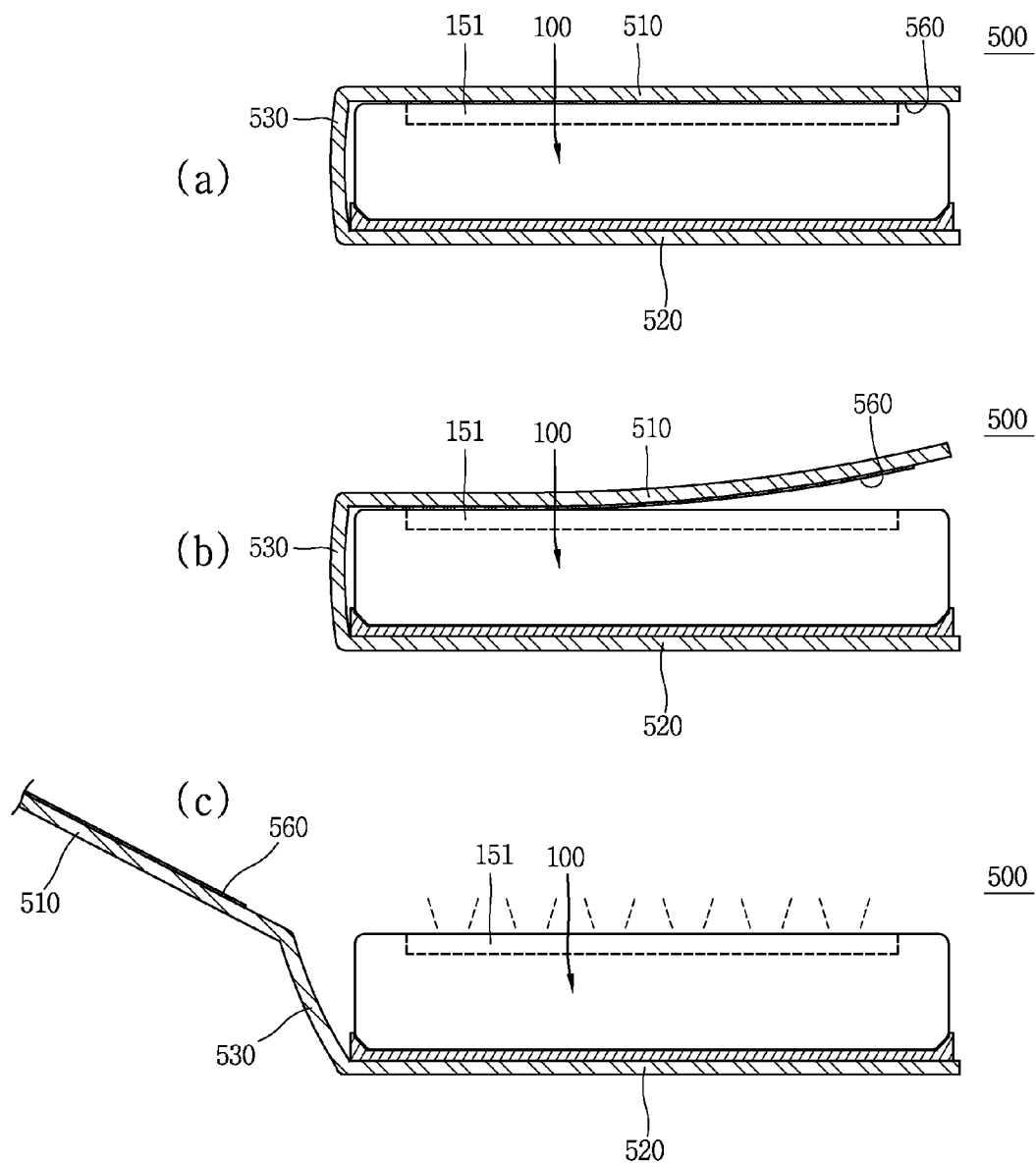


FIG. 9

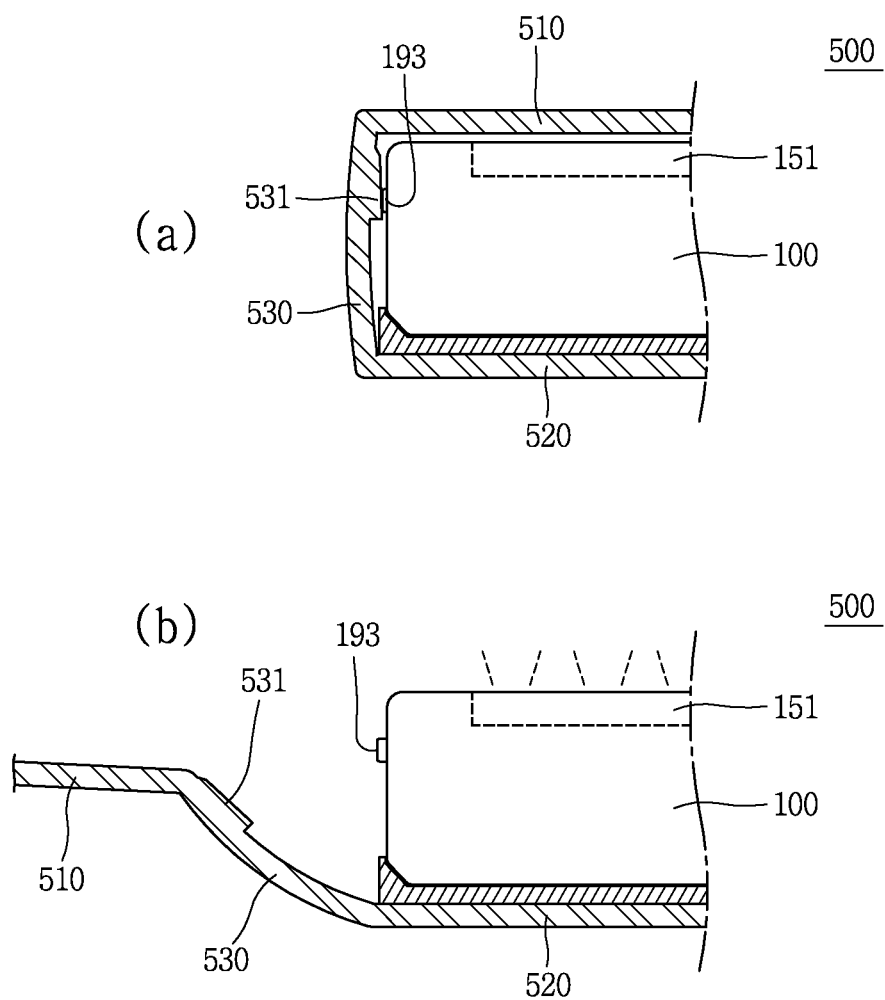


FIG. 10

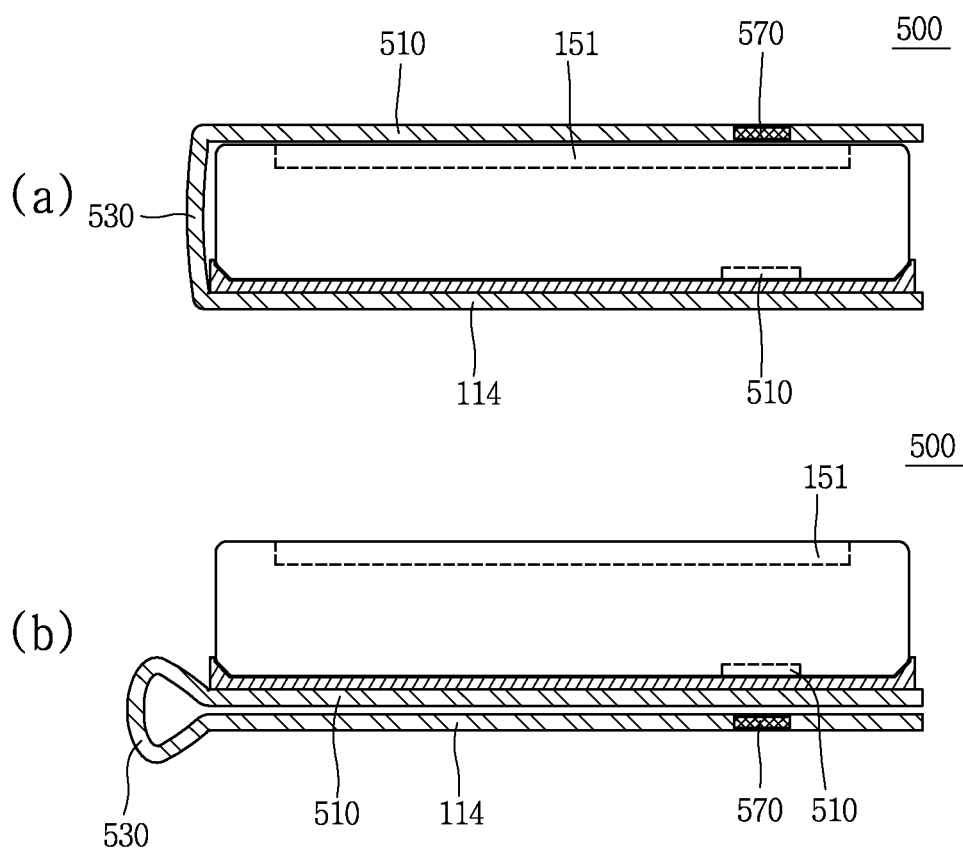
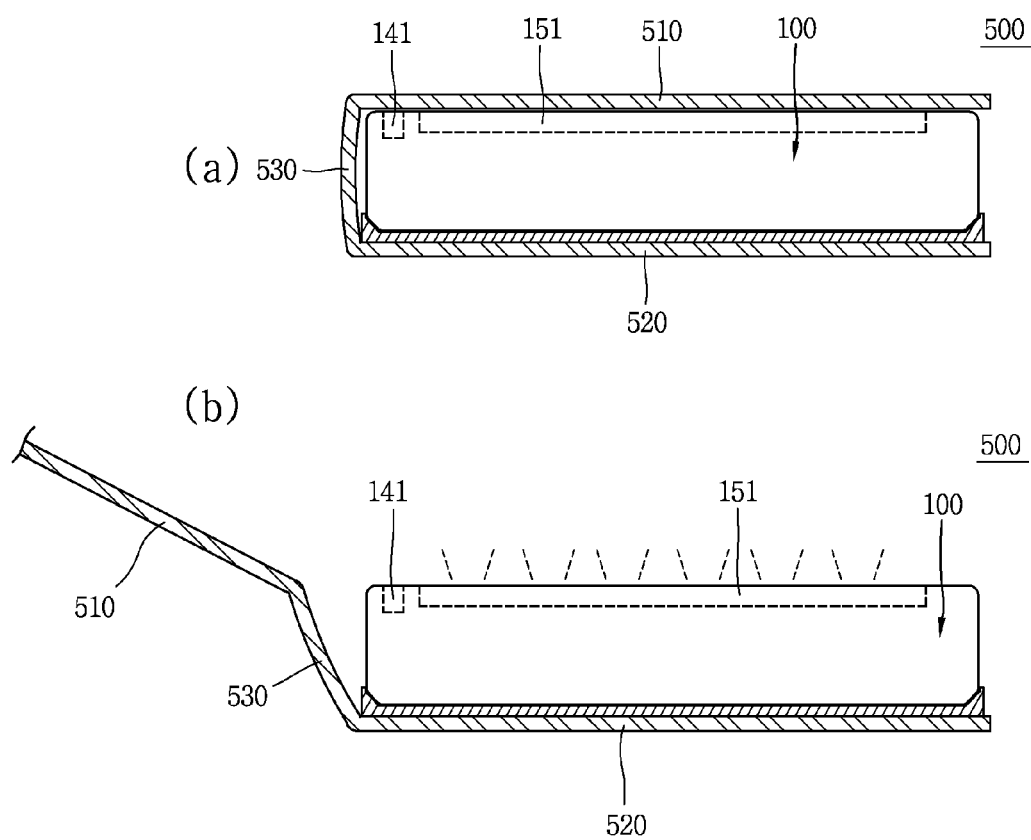


FIG. 11



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MOBILE TERMINAL

CROSS REFERENCE TO RELATED APPLICATIONS

Pursuant to 35 U.S.C. §119(a), this application claims the benefit of earlier filing date and right of priority to Korean Application No. 10-2013-0010051, filed in Republic of Korea on Jan. 29, 2013 the contents of which are incorporated by reference herein in its entirety.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a mobile terminal installed in a cover.

2. Description of the Related Art

In general, terminals may be divided into a mobile terminal and stationary terminal according to whether or not terminals are movable. In addition, mobile terminals may be divided into a handheld terminal and a vehicle mount terminal according to whether or not users can directly carry it around.

As such functions become more diversified, the mobile terminal can support more complicated functions such as capturing images or video, reproducing music or video files, playing games, receiving broadcast signals, and the like. By comprehensively and collectively implementing such functions, the mobile terminal may be embodied in the form of a multimedia player or device. Efforts are ongoing to support and increase the functionality of mobile terminals. Such efforts include software and hardware improvements, as well as changes and improvements in the structural components which form the mobile terminal.

Recently, mobile terminals are installed in a cover covering a terminal body to protect the terminal body from external impact or for the purpose of aesthetic appearance. Covers are fabricated to have various shapes, and in particular, in order to protect a display unit, a cover covering the entirety of outer surfaces of a terminal body is used.

However, in order to activate a display unit, a user should open the cover covering the display unit and turn on power of the display unit by using a power button, or the like, causing user inconvenience.

SUMMARY OF THE INVENTION

As aspect of the present invention provides a mobile terminal in which a display unit is automatically activated in a state in which cover is open.

To achieve these and other advantages and in accordance with the purpose of the present invention, as embodied and broadly described herein, the present invention provides in one aspect a mobile terminal including: a terminal body including a display unit formed on one surface thereof; a cover coupled to the terminal body such that it can be converted into a closed state in which the display is covered and an opened state in which the display unit is exposed; a signal generating unit configured to generate a state signal according to the closed state and the opened state; and a controller configured to control the display unit such that the display unit is activated in the opened state on the basis of the state signal.

In an example related to the present invention, the cover may include: a first member movably formed to implement the opened state and the closed state of the display unit; and a second member connected to the first member and formed to cover other regions of the terminal body.

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In an example related to the present invention, the cover may further include a connection portion connecting the first and second members and formed to be deformable according to a change to the closed state and the opened state, wherein the signal generating unit may include a deformation sensing film installed in the connection portion to sense deformation of the connection portion.

In an example related to the present invention, the deformation sensing film may provide a different current to the terminal body according to deformation of the connection portion, and a state signal is generated on the basis of the different current.

In an example related to the present invention, a plurality of state signals may be generated on the basis of different currents. The controller may activate the display unit and control the display unit in order to adjust brightness of the display unit on the basis of the plurality of state signals.

In an example related to the present invention, in order to sense whether the first and second members are in an overlapped state, the signal generating unit may be formed in respective overlap regions of the first and second members which overlap in the closed state.

In an example related to the present invention, the signal generating unit may include a magnet formed in the first member to change magnetism according to a change from the opened state to the closed state or from the closed state to the opened state and a sensor formed in the second member to sense a change in the magnetism.

In an example related to the present invention, the cover may further include: a terminal member electrically connected to the sensor to transmit a signal to the terminal body.

In an example related to the present invention, the controller may be connected to the sensor to control an activation state of the display unit according to a change in magnetism.

In an example related to the present invention, the first member may be movable so as to face the other surface of the terminal body in the opened state. The signal generating unit may include an identification tag installed in the first member and sensed by a short-range antenna installed within the terminal body.

In an example related to the present invention, when the tag is sensed by the short-range antenna, the signal generating unit may generate a state signal corresponding to the opened state.

In an example related to the present invention, the signal generating unit may include a conductive member installed in one surface of the first member facing the display unit and configured to change a value of flowing current upon being brought into contact with the display unit.

In an example related to the present invention, when an area in which the conductive member is brought into contact with the display unit is equal to or smaller than a pre-set reference area, the controller may control the display unit to be activated.

In an example related to the present invention, the signal generating unit may include a protrusion formed on an outer surface of the terminal body and pressurized according to a movement of the first member. When the protrusion is released from a pressurized state, the controller may control the display unit to be activated.

In an example related to the present invention, the cover may include a connection portion configured to connect the first and second members and disposed to be deformable according to a change from the closed state to the opened state or from the opened state to the closed state, wherein the connection portion may further include: a pressing unit

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formed in a region corresponding to the protrusion of the connection portion to pressurize the protrusion.

In an example related to the present invention, the signal generating unit may include at least one of an illumination sensor installed within the body of the terminal and configured to sense a change in intensity of illumination of the outward of the terminal body and a proximity sensor installed within the body of the terminal and configured to sense an object approaching the display unit within a pre-set distance.

In an example related to the present invention, when an increase in the intensity of illumination is sensed and an object approaching the display unit is not sensed, the controller may control the display unit to be activated.

In an example related to the present invention, the controller may activate the display unit when a pre-set time has lapsed since the state signal was generated.

To achieve these and other advantages and in accordance with the purpose of the present invention, as embodied and broadly described herein, the present invention provides in another aspect a cover of a mobile terminal, which is installed in a body of the mobile terminal having a display unit formed on one surface thereof, including: a first member formed to be movable to implement an opened state and a closed state of the display unit; a second member connected to a first region and formed to cover other regions of the terminal body; a connection portion configured to connect the first and second members and formed to be deformable according to a change from the closed state to the opened state or from the opened state to the closed state; and a deformation sensing film installed in the connection portion to sense deformation of the connection portion.

To achieve these and other advantages and in accordance with the purpose of the present invention, as embodied and broadly described herein, the present invention provides in another aspect a cover of a mobile terminal, which is installed in a body of the mobile terminal having a display unit formed on one surface thereof, including: a first member formed to be movable to implement an opened state and a closed state of the display unit; a second member connected to a first region and formed to cover other regions of the terminal body; a magnet formed in the first member to change magnetism according to a change from the opened state to the closed state or from the closed state to the opened state; and a hall sensor formed in the second member to sense a change in magnetism.

According to embodiments of the present invention, the display unit can be automatically activated according to a movement of the cover. Thus, the mobile terminal installed within the cover can be conveniently used.

Also, since an additional component for controlling the display unit according to a movement of the cover is not required in the mobile terminal, the internal structure of the terminal body can be simplified and an inner space can be secured.

Further scope of applicability of the present invention will become apparent from the detailed description given herein-after. However, it should be understood that the detailed description and specific examples, while indicating preferred embodiments of the invention, are given by illustration only, since various changes and modifications within the spirit and scope of the invention will become apparent to those skilled in the art from this detailed description.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention will become more fully understood from the detailed description given hereinbelow and the

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accompanying drawings, which are given by illustration only, and thus are not limitative of the present invention, and wherein:

FIG. 1 is a block diagram of a mobile terminal according to an embodiment of the present invention.

FIGS. 2A and 2B are conceptual views of communication systems in which the mobile terminal according to an embodiment of the present invention is operable.

FIG. 3A is a front perspective view of the mobile terminal related to the present invention.

FIG. 3B is a rear perspective view of the mobile terminal illustrated in FIG. 3A.

FIG. 4 is a perspective view of a cover for a mobile terminal that may be coupled to the mobile terminal.

FIGS. 5A through 5D are perspective views illustrating operational states of a cover coupled to the mobile terminal.

FIGS. 6A through 6C are views illustrating a cover for a mobile terminal according to a first embodiment of the present invention.

FIG. 7A is a perspective view of the mobile terminal installed in a cover according to another embodiment of the present invention.

FIG. 7B is a partial cross-sectional view illustrating a first state of FIG. 7A.

FIG. 8 is a partial cross-sectional view illustrating a cover according to another embodiment of the present invention.

FIG. 9 is a partial cross-sectional view illustrating a mobile terminal installed in a cover according to another embodiment of the present invention.

FIG. 10 is a partial cross-sectional view illustrating a mobile terminal installed in a cover according to another embodiment of the present invention.

FIG. 11 is a partial cross-sectional view illustrating a mobile terminal installed in a cover according to another embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

The embodiments of the present invention will now be described with reference to the accompanying drawings, in which like numbers refer to like elements throughout although the embodiments are different, and a description of the like elements a first embodiment will be used for those of the different embodiment. In the following description, usage of suffixes such as 'module', 'part' or 'unit' used for referring to elements is given merely to facilitate explanation of the present invention, without having any significant meaning by itself. In describing the present invention, if a detailed explanation for a related known function or construction is considered to unnecessarily divert the gist of the present invention, such explanation has been omitted but would be understood by those skilled in the art. The accompanying drawings of the present invention aim to facilitate understanding of the present invention and should not be construed as limited to the accompanying drawings.

Mobile terminals described in the present disclosure may include mobile phones, smart phones, notebook computers, tablet computers, digital broadcast receivers, PDAs (Personal Digital Assistants), PMPs (Portable Multimedia Player), navigation devices, slate PCs, tablet PCs, ultra-books, and the like. However, it would be understood by a person skilled in the art that the configuration according to embodiments of the present invention can be also applicable to the fixed types of terminals such as digital TVs, desk top computers, and the like, except for any elements especially configured for a mobile purpose.

FIG. 1 is a block diagram of a mobile terminal according to an embodiment of the present invention.

The mobile terminal **100** may include a wireless communication unit **110**, an A/V (Audio/Video) input unit **120**, a user input unit **130**, a sensing unit **140**, an output unit **150**, a memory **160**, an interface unit **170**, a controller **180**, and a battery **191**, etc. FIG. 1 shows the mobile terminal as having various components, but it should be understood that implementing all of the illustrated components is not a requirement. Greater or fewer components may alternatively be implemented.

The elements of the mobile terminal will be described in detail as follows.

The wireless communication unit **110** typically includes one or more modules allowing radio communication between the mobile terminal **100** and a wireless communication system or a network in which the mobile terminal is located. For example, the wireless communication unit may include at least one of a broadcast receiving module **111**, a mobile communication module **112**, a wireless Internet module **113**, a short-range communication module **114**, and a location information module **115**.

The broadcast receiving module **111** receives broadcast signals and/or broadcast associated information from an external broadcast management server (or other network entity) via a broadcast channel.

The broadcast channel may include a satellite channel and/or a terrestrial channel. The broadcast management server may be a server that generates and transmits a broadcast signal and/or broadcast associated information or a server that receives a previously generated broadcast signal and/or broadcast associated information and transmits the same to a terminal. The broadcast signal may include a TV broadcast signal, a radio broadcast signal, a data broadcast signal, and the like. Also, the broadcast signal may further include a broadcast signal combined with a TV or radio broadcast signal.

The broadcast associated information may refer to information associated with a broadcast channel, a broadcast program or a broadcast service provider. The broadcast associated information may also be provided via a mobile communication network and, in this case, the broadcast associated information may be received by the mobile communication module **112**.

The broadcast associated information may exist in various forms. For example, it may exist in the form of an electronic program guide (EPG) of digital multimedia broadcasting (DMB), electronic service guide (ESG) of digital video broadcast-handheld (DVB-H), and the like.

The broadcast receiving module **111** may be configured to receive signals broadcast by using various types of broadcast systems. In particular, the broadcast receiving module **111** may receive a digital broadcast by using a digital broadcast system such as multimedia broadcasting-terrestrial (DMB-T), digital multimedia broadcasting-satellite (DMB-S), digital video broadcast-handheld (DVB-H), the data broadcasting system known as media forward link only (MediaFLO®), integrated services digital broadcast-terrestrial (ISDB-T), etc. The broadcast receiving module **111** may be configured to be suitable for every broadcast system that provides a broadcast signal as well as the above-mentioned digital broadcast systems.

Broadcast signals and/or broadcast-associated information received via the broadcast receiving module **111** may be stored in the memory **160**.

The mobile communication module **112** transmits and/or receives radio signals to and/or from at least one of a base

station, an external terminal and a server. Such radio signals may include a voice call signal, a video call signal or various types of data according to text and/or multimedia message transmission and/or reception.

The wireless Internet module **113** supports wireless Internet access for the mobile terminal. This module may be internally or externally coupled to the terminal. The wireless Internet access technique implemented may include a WLAN (Wireless LAN) (Wi-Fi), Wibro (Wireless broadband), Wimax (World Interoperability for Microwave Access), HSDPA (High Speed Downlink Packet Access), or the like.

The short-range communication module **114** is a module for supporting short range communications. Some examples of short-range communication technology include Bluetooth™, Radio Frequency IDentification (RFID), Infrared Data Association (IrDA), Ultra-WideBand (UWB), Zig-Bee™, and the like.

The location information module **115** is a module for checking or acquiring a location (or position) of the mobile terminal. A typical example of the location information module is a GPS (Global Positioning System) or a WiFi (Wireless Fidelity) module.

With reference to FIG. 1, the A/V input unit **120** is configured to receive an audio or video signal. The NV input unit **120** may include a camera **121** and a microphone **122**. The camera **121** processes image data of still pictures or video obtained by an image capture device in a video capturing mode or an image capturing mode. The processed image frames may be displayed on a display unit **151**.

The image frames processed by the camera **121** may be stored in the memory **160** (or other storage medium) or transmitted via the wireless communication unit **110**. Two or more cameras **121** may be provided according to the configuration of the mobile terminal.

The microphone **122** may receive sounds (audible data) via a microphone in a phone call mode, a recording mode, a voice recognition mode, and the like, and can process such sounds into audio data. The processed audio (voice) data may be converted for output into a format transmittable to a mobile communication base station via the mobile communication module **112** in case of the phone call mode. The microphone **122** may implement various types of noise canceling (or suppression) algorithms to cancel (or suppress) noise or interference generated in the course of receiving and transmitting audio signals.

The user input unit **130** may generate input data from commands entered by a user to control various operations of the mobile terminal. The user input unit **130** may include a keypad, a dome switch, a touch pad, a jog wheel, a jog switch, and the like.

The sensing unit **140** detects a current status (or state) of the mobile terminal **100** such as an opened or closed state of the mobile terminal **100**, a location of the mobile terminal **100**, the presence or absence of user contact with the mobile terminal **100** (i.e., touch inputs), the orientation of the mobile terminal **100**, an acceleration or deceleration movement and direction of the mobile terminal **100**, etc., and generates commands or signals for controlling the operation of the mobile terminal **100**. For example, when the mobile terminal **100** is implemented as a slide type mobile phone, the sensing unit **140** may sense whether the slide phone is opened or closed. In addition, the sensing unit **140** can detect whether or not the battery **191** supplies power or whether or not the interface unit **170** is coupled with an external device.

As an example of the 3D sensor, the sensing unit **140** may include a proximity sensor **141**, a stereoscopic touch sensing unit **142**, an ultrasound sensing unit **143**, and a camera sensing unit **144**.

The proximity sensor **141** measures a distance between the sensing object (for example, the user's finger or stylus pen) and a detection surface to which a touch is applied using an electromagnetic field or infrared rays without a mechanical contact. The terminal may recognize which portion of a stereoscopic image has been touched by using the measured distance. In particular, when the touch screen is implemented with a capacitance type, it may be configured such that the proximity level of a sensing object is sensed by changes of an electromagnetic field according to the proximity of the sensing object to recognize a 3-dimensional touch using the proximity level.

The stereoscopic touch sensing unit **142** may be configured to sense the strength or duration time of a touch applied to the touch screen. For example, stereoscopic touch sensing unit **142** senses a user applied touch pressure, and if the applied pressure is strong, then the stereoscopic touch sensing unit **142** recognizes it as a touch for an object located farther from the touch screen.

The ultrasound sensing unit **143** may be configured to sense the location of the sensing object using ultrasound.

For example, the ultrasound sensing unit **143** may be configured with an optical sensor and a plurality of ultrasound sensors. The optical sensor may be formed to sense light, and the ultrasound sensor may be formed to sense ultrasound waves. Since light is far faster than ultrasound waves, the time for light to reach the optical sensor is far faster than the time for ultrasound waves to reach the ultrasound sensor. Accordingly, the location of the wave generating source may be calculated using a time difference between the light and ultrasound waves to reach the optical sensor.

The camera sensing unit **144** may include at least one of a camera **121**, a photo sensor, and a laser sensor.

The output unit **150** is configured to provide outputs in a visual, audible, and/or tactile manner (e.g., audio signal, video signal, alarm signal, vibration signal, etc.). The output unit **150** may include the display unit **151**, an audio output module **152**, an alarm unit **153**, a haptic module **154**, and the like.

The display unit **151** may display (output) information processed in the mobile terminal **100**. For example, when the mobile terminal **100** is in a phone call mode, the display unit **151** may display a User Interface (UI) or a Graphic User Interface (GUI) associated with a call or other communication (such as text messaging, multimedia file downloading, etc.). When the mobile terminal **100** is in a video call mode or image capturing mode, the display unit **151** may display a captured image and/or received image, a UI or GUI that shows videos or images and functions related thereto, and the like.

The display unit **151** may include at least one of a Liquid Crystal Display (LCD), a Thin Film Transistor-LCD (TFT-LCD), an Organic Light Emitting Diode (OLED) display, a flexible display, a three-dimensional (3D) display, and an e-ink display.

Some of them may be configured to be transparent or light-transmissive to allow viewing of the exterior, which may be called transparent displays. A typical transparent display may be, for example, a TOLED (Transparent Organic Light Emitting Diode) display, or the like. Through such configuration, the user can view an object positioned at the rear side of the terminal body through the region occupied by the display unit **151** of the terminal body.

The mobile terminal **100** may include two or more display units according to its particular desired embodiment. For example, a plurality of display units may be separately or integrally disposed on one surface of the mobile terminal, or may be separately disposed on mutually different surfaces.

Also, the display unit **151** may be configured as a stereoscopic display unit displaying a stereoscopic image.

Here, the stereoscopic image may be a three-dimensional (3D) stereoscopic image. The 3D stereoscopic image is an image that refers to an image making a viewer feel that a gradual depth and reality of an object on a monitor or a screen is the same as a reality space. A 3D stereoscopic image is implemented by using binocular disparity. Binocular disparity refers to disparity made by the positions of two eyes. When two eyes view different 2D images, the images are transferred to the brain through the retina and combined in the brain to provide the perception of depth and reality sense.

The stereoscopic display unit may employ a stereoscopic display scheme such as stereoscopic scheme (glass scheme), an auto-stereoscopic scheme (glassless scheme), a projection scheme (holographic scheme), or the like. Stereoscopic schemes commonly used for home television receivers, or the like, include the stereoscopic scheme, or the like.

The auto-stereoscopic scheme includes, for example, a parallax barrier scheme, a lenticular scheme, an integral imaging scheme, or the like. The projection scheme includes a reflective holographic scheme, a transmissive holographic scheme, or the like.

In general, a 3D stereoscopic image is comprised of a left image (a left eye image) and a right image (a right eye image). According to how left and right images are combined into a 3D stereoscopic image, the 3D stereoscopic imaging method is divided into a top-down method in which left and right images are disposed up and down in a frame, an L-to-R (left-to-right, side by side) method in which left and right images are disposed left and right in a frame, a checker board method in which fragments of left and right images are disposed in a tile form, an interlaced method in which left and right images are alternately disposed by columns and rows, and a time sequential (or frame by frame) method in which left and right images are alternately displayed by time.

Also, as for a 3D thumbnail image, a left image thumbnail and a right image thumbnail are generated from a left image and a right image of the original image frame, respectively, and then combined to generate a single 3D thumbnail image. In general, thumbnail refers to a reduced image or a reduced still image. The thusly generated left image thumbnail and the right image thumbnail are displayed with a horizontal distance difference therebetween by a depth corresponding to the disparity between the left image and the right image on the screen, providing a stereoscopic space sense.

A left image and a right image required for implementing a 3D stereoscopic image is displayed on the stereoscopic display unit by a stereoscopic processing unit. The stereoscopic processing unit may receive the 3D image and extract the left image and the right image, or may receive the 2D image and change it into a left image and a right image.

Meanwhile, when the display unit **151** and a sensor (referred to as a 'touch sensor', hereinafter) for detecting a touch operation are overlaid in a layered manner to form a touch screen, the display unit **151** may function as both an input device and an output device. The touch sensor may have a form of a touch film, a touch sheet, a touch pad, and the like.

The touch sensor may be configured to convert pressure applied to a particular portion of the display unit **151** or a change in the capacitance or the like generated at a particular portion of the display unit **151** into an electrical input signal.

The touch sensor may be configured to detect the pressure when a touch is applied, as well as the touched position and area.

When there is a touch input with respect to the touch sensor, a corresponding signal (signals) are transmitted to a touch controller. The touch controller processes the signals and transmits corresponding data to the controller **180**. Accordingly, the controller **180** may recognize which portion of the display unit **151** has been touched.

With reference to FIG. 1, a proximity sensor **141** may be disposed within or near the touch screen. The proximity sensor **141** is a sensor for detecting the presence or absence of an object relative to a certain detection surface or an object that exists nearby by using the force of electromagnetism or infrared rays without a physical contact. Thus, the proximity sensor **141** has a considerably longer life span compared with a contact type sensor, and it can be utilized for various purposes.

Examples of the proximity sensor **141** may include a transmission type photoelectric sensor, a direct reflection type photoelectric sensor, a mirror-reflection type photoelectric sensor, an RF oscillation type proximity sensor, a capacitance type proximity sensor, a magnetic proximity sensor, an infrared proximity sensor, and the like. In case where the touch screen is the capacitance type, proximity of the pointer is detected by a change in electric field according to the proximity of the pointer. In this case, the touch screen (touch sensor) may be classified as a proximity sensor.

In the following description, for the sake of brevity, recognition of the pointer positioned to be close to the touch screen will be called a 'proximity touch', while recognition of actual contacting of the pointer on the touch screen will be called a 'contact touch'. In this case, when the pointer is in the state of the proximity touch, it means that the pointer is positioned to correspond vertically to the touch screen.

By employing the proximity sensor **141**, a proximity touch and a proximity touch pattern (e.g., a proximity touch distance, a proximity touch speed, a proximity touch time, a proximity touch position, a proximity touch movement state, or the like) can be detected, and information corresponding to the detected proximity touch operation and the proximity touch pattern can be outputted to the touch screen.

When a touch sensor is overlaid on the stereoscopic display unit in a layered manner, or when the stereoscopic display unit and a 3D sensor sensing a touch operation are combined, the stereoscopic display unit may also be used as a 3D input device.

Such as the sensing unit **140** may include a proximity sensor **141**, a stereoscopic touch sensing unit **142**, an ultrasonic sensing unit **143**, and a camera sensing unit **144**.

The proximity sensor **141** detects the distance between a sensing object (e.g., the user's finger or a stylus) applying a touch by using the force of electromagnetism or infrared rays without a mechanical contact and a detect surface. By using the distance, the terminal recognizes which portion of a stereoscopic image has been touched. In particular, when the touch screen is an electrostatic touch screen, the degree of proximity of the sensing object is detected based on a change of an electric field according to proximity of the sensing object, and a touch to the 3D image is recognized by using the degree of proximity.

The stereoscopic touch sensing unit **142** is configured to detect the strength or duration of a touch applied to the touch screen. For example, the stereoscopic touch sensing unit **142** senses pressure applying a touch, and the applied pressure is strong, the stereoscopic touch sensing unit **142** recognizes the

touch as a touch with respect to an object positioned to be farther from the touch screen toward the inward of the terminal.

The ultrasonic sensing unit **143** is configured to recognize position information of the sensing object by using ultrasonic waves.

The ultrasonic sensing unit **143** may include, for example, an optical sensor and a plurality of ultrasonic sensors. The optical sensor is configured to sense light, and the ultrasonic sensors may be configured to sense ultrasonic waves. Since light is very faster than ultrasonic waves, light reaches the optical sensor very earlier than ultrasonic waves reach the ultrasonic sensors. Thus, based on light as a reference signal, a position of a wave generation source may be calculated by using a time difference between a time at which light reaches the optical sensor and a time at which ultrasonic waves reach the ultrasonic sensors.

The camera sensing unit **144** includes at least one of a camera, a photo sensor, and a laser sensor.

For example, the camera and the laser sensor may be combined to detect a touch of the sensing object with respect to a 3D stereoscopic image. When distance information detected by a laser sensor is added to a 2D image captured by the camera, 3D information can be obtained.

In another example, a photo sensor may be laminated on the display unit **151**. The photo sensor is configured to scan a movement of the sensing object in proximity to the touch screen. In detail, the photo sensor includes photo diodes and transistors at rows and columns to scan content mounted on the photo sensor by using an electrical signal changing according to the quantity of applied light. Namely, the photo sensor calculates the coordinates of the sensing object according to variation of light to thus obtain position information of the sensing object.

The audio output module **152** may convert and output as sound audio data received from the wireless communication unit **110** or stored in the memory **160** in a call signal reception mode, a call mode, a record mode, a voice recognition mode, a broadcast reception mode, and the like. Also, the audio output module **152** may provide audible outputs related to a particular function performed by the mobile terminal **100** (e.g., a call signal reception sound, a message reception sound, etc.). The audio output module **152** may include a speaker, a buzzer, or other sound generating device.

The alarm unit **153** outputs a signal for informing about an occurrence of an event of the mobile terminal **100**. Events generated in the mobile terminal may include call signal reception, message reception, key signal inputs, a touch input etc. In addition to video or audio signals, the alarm unit **153** may output signals in a different manner, for example, to inform about an occurrence of an event. The video or audio signals may be also outputted via the audio output module **152**, so the display unit **151** and the audio output module **152** may be classified as parts of the alarm unit **153**.

A haptic module **154** generates various tactile effects the user may feel. A typical example of the tactile effects generated by the haptic module **154** is vibration. The strength and pattern of the haptic module **154** can be controlled. For example, different vibrations may be combined to be outputted or sequentially outputted.

Besides vibration, the haptic module **154** may generate various other tactile effects such as an effect by stimulation such as a pin arrangement vertically moving with respect to a contact skin, a spray force or suction force of air through a jet orifice or a suction opening, a contact on the skin, a contact of

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an electrode, electrostatic force, etc., an effect by reproducing the sense of cold and warmth using an element that can absorb or generate heat.

The haptic module **154** may be implemented to allow the user to feel a tactile effect through a muscle sensation such as fingers or arm of the user, as well as transferring the tactile effect through a direct contact. Two or more haptic modules **155** may be provided according to the configuration of the mobile terminal **100**.

The memory **160** may store software programs used for the processing and controlling operations performed by the controller **180**, or may temporarily store data (e.g., a phonebook, messages, still images, video, etc.) that are inputted or outputted. In addition, the memory **160** may store data regarding various patterns of vibrations and audio signals outputted when a touch is inputted to the touch screen.

The memory **160** may include at least one type of storage medium including a Flash memory, a hard disk, a multimedia card micro type, a card-type memory (e.g., SD or DX memory, etc.), a Random Access Memory (RAM), a Static Random Access Memory (SRAM), a Read-Only Memory (ROM), an Electrically Erasable Programmable Read-Only Memory (EEPROM), a Programmable Read-Only memory (PROM), a magnetic memory, a magnetic disk, and an optical disk. Also, the mobile terminal **100** may be operated in relation to a web storage device that performs the storage function of the memory **160** over the Internet.

The interface unit **170** serves as an interface with every external device connected with the mobile terminal **100**. For example, the external devices may transmit data to an external device, receives and transmits power to each element of the mobile terminal **100**, or transmits internal data of the mobile terminal **100** to an external device. For example, the interface unit **170** may include wired or wireless headset ports, external power supply ports, wired or wireless data ports, memory card ports, ports for connecting a device having an identification module, audio input/output (I/O) ports, video I/O ports, earphone ports, or the like.

The identification module may be a chip that stores various information for authenticating the authority of using the mobile terminal **100** and may include a user identity module (UIM), a subscriber identity module (SIM) a universal subscriber identity module (USIM), and the like. In addition, the device having the identification module (referred to as 'identifying device', hereinafter) may take the form of a smart card. Accordingly, the identifying device may be connected with the terminal **100** via a port.

When the mobile terminal **100** is connected with an external cradle, the interface unit **170** may serve as a passage to allow power from the cradle to be supplied to the mobile terminal **100** or may serve as a passage to allow various command signals input by the user from the cradle to be transferred to the mobile terminal. Various command signals or power input from the cradle may operate as signals for recognizing that the mobile terminal is properly mounted on the cradle.

The controller **180** typically controls the general operations of the mobile terminal. For example, the controller **180** performs controlling and processing associated with voice calls, data communications, video calls, and the like. The controller **180** may include a multimedia module **181** for reproducing multimedia data. The multimedia module **181** may be configured within the controller **180** or may be configured to be separated from the controller **180**.

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The controller **180** may perform a pattern recognition processing to recognize a handwriting input or a picture drawing input performed on the touch screen as characters or images, respectively.

Also, when a state of the mobile terminal satisfies pre-set conditions, the controller **180** may execute a locked state for limiting an input of a control command of the user. Also, in the locked state, the controller **180** may control a locked screen displayed in the locked state on the basis of a touch input sensed through the display unit **151**.

The battery **191** receives external power or internal power and supplies appropriate power required for operating respective elements and components under the control of the controller **180**.

Various embodiments described herein may be implemented in a computer-readable or its similar medium using, for example, software, hardware, or any combination thereof.

For hardware implementation, the embodiments described herein may be implemented by using at least one of application specific integrated circuits (ASICs), digital signal processors (DSPs), digital signal processing devices (DSPDs), programmable logic devices (PLDs), field programmable gate arrays (FPGAs), processors, controllers, micro-controllers, microprocessors, electronic units designed to perform the functions described herein. In some cases, such embodiments may be implemented by the controller **180** itself.

For software implementation, the embodiments such as procedures or functions described herein may be implemented by separate software modules. Each software module may perform one or more functions or operations described herein.

Software codes can be implemented by a software application written in any suitable programming language. The software codes may be stored in the memory **160** and executed by the controller **180**.

Hereinafter, a communication system implementable through the mobile terminal **100** according to an embodiment of the present invention will be described.

FIGS. 2A and 2B are conceptual views of communication systems in which the mobile terminal **100** according to an embodiment of the present invention is operable.

First, referring to FIG. 2A, a communication system may use different air interfaces and/or physical layers. For example, air interfaces utilized by the communication systems include example, frequency division multiple access (FDMA), time division multiple access (TDMA), code division multiple access (CDMA), and universal mobile telecommunications system (UMTS) (in particular, long term evolution (LTE)), global system for mobile communications (GSM), and the like. As a non-limiting example, the description hereafter relates to a CDMA communication system, but such teachings apply equally to other types of systems.

Hereinafter, for the description purpose, CDMA will be described, but, obviously, the present invention is applicable to any communication system including a CDMA wireless communication system.

Referring to FIG. 2, a CDMA wireless communication system may include a plurality of mobile terminals **100**, a plurality of base stations (BSs) **270**, base station controllers (BSCs) **275**, and a mobile switching center (MSC) **280**. The MSC **280** is configured to interface with a public switch telephone network (PSTN) **290**. The MSC **280** is also configured to interface with the BSCs **275**, which may be coupled to the base stations **270** via backhaul lines. The backhaul lines may be configured in accordance with any of several known interfaces including, for example, E1/T1, ATM, IP, PPP,

Frame Relay, HDSL, ADSL, or xDSL. It is to be understood that the system as shown in FIG. 2 may include a plurality of BSCs 275.

Each BS 270 may serve one or more sectors (or regions), each sector covered by an omni-directional antenna or an antenna pointed in a particular direction radially away from the BS 270. Alternatively, each sector may be covered by two or more antennas for diversity reception. Each BS 270 may be configured to support a plurality of frequency assignments, and each frequency assignment has a particular spectrum (e.g., 1.25 MHz, 5 MHz, etc).

The intersection of a sector and frequency assignment may be referred to as a CDMA channel. The BS 270 may also be referred to as base station transceiver subsystems (BTSs) or other equivalent terms. In such case, the term "base station" may be used to collectively refer to a single BSC 275 and at least one BS 270. The base station may also be referred to as a "cell site". Alternatively, individual sectors of a particular BS 270 may be referred to as a plurality of cell sites.

As shown in FIG. 2A, a broadcasting transmitter (BT) 295 transmits a broadcast signal to the mobile terminals 100 operating within the system. The broadcast receiving module 111 as shown in FIG. 1 is provided at the terminal 100 to receive broadcast signals transmitted by the BT 295.

Also, in FIG. 2A, several global positioning systems (GPS) satellites 300 are shown. The satellites 300 help locate at least one of a plurality of terminals 100. In FIG. 2, several satellites 300 are depicted, but it is understood that useful positioning information may be obtained with any number of satellites. The GPS module 115 as shown in FIG. 1 is typically configured to cooperate with the satellites 300 to obtain desired positioning information. Instead of or in addition to GPS tracking techniques, other technologies that may track the location of the mobile terminals may be used. In addition, at least one of the GPS satellites 300 may selectively or additionally handle satellite DMB transmissions.

As one typical operation of the wireless communication system, the BSs 270 receive reverse-link signals from various mobile terminals 100. The mobile terminals 100 typically engaging in calls, messaging, and other types of communications. Each reverse-link signal received by a particular base station 270 is processed within the particular BS 270. The resulting data is forwarded to an associated BSC 275. The BSC provides call resource allocation and mobility management functionality including the coordination of soft handoff procedures between BSs 270. The BSCs 275 also route the received data to the MSC 280, which provides additional routing services for interfacing with the PSTN 290. Similarly, the PSTN 290 interfaces with the MSC 280, the MSC interfaces with the BSCs 275, and the BSCs 275 in turn control the BSs 270 to transmit forward-link signals to the mobile terminals 100.

Next, a method of acquiring the location information of a mobile terminal using a WiFi (Wireless Fidelity) positioning system (WPS) will be described with reference to FIG. 2B.

The WiFi positioning system (WPS) 300 refers to a location determination technology based on a wireless local area network (WLAN) using WiFi as a technology for tracking the location of the mobile terminal 100 using a WiFi module provided in the mobile terminal 100 and a wireless access point (AP) 320 for transmitting and receiving to and from the WiFi module.

The WiFi positioning system 300 may include a WiFi location determination server 310, a mobile terminal 100, a wireless AP 320 connected to the mobile terminal 100, and a database 330 stored with any wireless AP information.

The WiFi location determination server 310 extracts the information of the wireless AP 320 connected to the mobile terminal 100 based on a location information request message (or signal) of the mobile terminal 100. The information of the wireless AP 320 may be transmitted to the WiFi location determination server 310 through the mobile terminal 100 or transmitted to the WiFi location determination server 310 from the wireless AP 320.

The information of the wireless AP extracted based on the location information request message of the mobile terminal 100 may be at least one of MAC address, SSID, RSSI, channel information, privacy, network type, signal strength and noise strength.

The WiFi location determination server 310 receives the information of the wireless AP 320 connected to the mobile terminal 100 as described above, and compares the received wireless AP 320 information with information contained in the pre-established database 330 to extract (or analyze) the location information of the mobile terminal 100.

On the other hand, referring to FIG. 2B, as an example, the wireless AP connected to the mobile terminal 100 is illustrated as a first, a second, and a third wireless AP 320. However, the number of wireless APs connected to the mobile terminal 100 may be changed in various ways according to a wireless communication environment in which the mobile terminal 100 is located. When the mobile terminal 100 is connected to at least one of wireless APs, the WiFi positioning system 300 can track the location of the mobile terminal 100.

Next, considering the database 330 stored with any wireless AP information in more detail, various information of any wireless APs disposed at different locations may be stored in the database 330.

The information of any wireless APs stored in the database 330 may be information such as MAC address, SSID, RSSI, channel information, privacy, network type, latitude and longitude coordinate, building at which the wireless AP is located, floor number, detailed indoor location information (GPS coordinate available), AP owner's address, phone number, and the like.

In this manner, any wireless AP information and location information corresponding to the any wireless AP are stored together in the database 330, and thus the WiFi location determination server 310 may retrieve wireless AP information corresponding to the information of the wireless AP 320 connected to the mobile terminal 100 from the database 330 to extract the location information matched to the searched wireless AP, thereby extracting the location information of the mobile terminal 100.

Furthermore, the extracted location information of the mobile terminal 100 may be transmitted to the mobile terminal 100 through the WiFi location determination server 310, thereby acquiring the location information of the mobile terminal 100.

Hereinafter, a mobile terminal according to an embodiment of the present disclosure as illustrated in FIG. 1 or a mobile terminal disposed with the constituent elements of the mobile terminal or the structure of a mobile terminal will be described.

FIG. 3A is a front perspective view illustrating an example of the mobile terminal 100 associated with the present disclosure.

The mobile terminal 100 disclosed herein is provided with a bar-type terminal body. However, the present invention may not be limited to this, but also may be applicable to various structures such as watch type, clip type, glasses type or folder

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type, flip type, swing type, swivel type, or the like, in which two and more bodies are combined with each other in a relatively movable manner.

The terminal body includes a case (casing, housing, cover, etc.) forming the appearance of the terminal. In this embodiment, the case may be divided into a front case **101** and a rear case **102**. Various electronic components are incorporated into a space formed between the front case **101** and the rear case **102**. At least one middle case may be additionally disposed between the front case **101** and the rear case **102**, and a battery cover **103** for covering the battery **191** may be detachably configured at the rear case **102**.

The cases may be formed by injection-molding a synthetic resin or may be also formed of a metal, for example, stainless steel (STS), titanium (Ti), or the like.

A display unit **151**, a first audio output module **153a**, a first camera **121a**, a first manipulating unit **131** and the like may be disposed on a front surface of the terminal body, and a microphone **122**, an interface unit **170**, a second manipulating unit **132** and the like may be provided on a lateral surface thereof.

The display unit **151** may be configured to display (output) information being processed in the mobile terminal **100**. The display unit **151** may include at least one of a liquid crystal display (LCD), a thin film transistor-liquid crystal display (TFT-LCD), an organic light emitting diode (OLED) display, a flexible display, a 3-dimensional (3D) display, and an e-ink display.

The display unit **151** may include a sensing unit **140** to receive a control command by a touch method. When a touch is made to any one place on the display unit **151**, the sensing unit **140** may be configured to sense this touch and enter the content corresponding to the touched place. The content entered by a touch method may be a text or numerical value, or a menu item capable of indication or designation in various modes.

The sensing unit **140** may be formed with transparency to allow visual information displayed on the display unit **151** to be seen, and may include a structure for enhancing the visibility of a touch screen at bright places. Referring to FIG. 3A, the display unit **151** occupies most of the front surface of the front case **101**.

The first audio output module **153a** and the first camera **121a** are disposed in a region adjacent to one of both ends of the display unit **151**, and the first manipulation input unit **131** and the microphone **122** are disposed in a region adjacent to the other end thereof. The second manipulation unit **132** (refer to FIG. 3B), the interface **170**, and the like, may be disposed on a lateral surface of the terminal body.

The first audio output module **153a** may be implemented in the form of a receiver for transferring voice sounds to the user's ear or a loud speaker for outputting various alarm sounds or multimedia reproduction sounds.

It may be configured such that the sounds generated from the first audio output module **153a** are released along an assembly gap between the structural bodies. In this case, a hole independently formed to output audio sounds may not be seen or hidden in terms of appearance, thereby further simplifying the appearance of the mobile terminal **100**. However, the present invention may not be limited to this, but a hole for releasing the sounds may be formed on the window.

The first camera **121a** processes video frames such as still or moving images obtained by the image sensor in a video call mode or capture mode. The processed video frames may be displayed on the display unit **151**.

The user input unit **130** is manipulated to receive a command for controlling the operation of the mobile terminal **100**. The user input unit **130** may include a first and a second

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manipulation unit **131**, **132**. The first and the second manipulation unit **131**, **132** may be commonly referred to as a manipulating portion, and any method may be employed if it is a tactile manner allowing the user to perform manipulation with a tactile feeling such as touch, push, scroll or the like.

In the present embodiment, it is illustrated on the basis that the first manipulation unit **131** is a touch key, but the invention may not be necessarily limited to this. For example, the first manipulation unit **131** may be configured with a mechanical key, or a combination of a touch key and a mechanical key.

The content received by the first and/or second manipulation units **131**, **132** may be set in various ways. For example, the first manipulation unit **131** may be used to receive a command such as menu, home key, cancel, search, or the like, and the second manipulation unit **132** may receive a command, such as controlling a volume level being outputted from the first audio output module **153a**, or switching into a touch recognition mode of the display unit **151**.

The microphone **122** may be formed to receive the user's voice, other sounds, or the like. The microphone **122** may be provided at a plurality of places, and configured to receive stereo sounds.

The interface unit **170** serves as a path allowing the mobile terminal **100** to exchange data with external devices. For example, the interface unit **170** may be at least one of a connection terminal for connecting to an earphone in a wired or wireless manner, a port for near field communication (for example, an Infrared Data Association (IrDA) port, a Bluetooth port, a wireless LAN port, and the like), and a power supply terminal for supplying power to the mobile terminal **100**. The interface unit **170** may be implemented in the form of a socket for accommodating an external card such as Subscriber Identification Module (SIM) or User Identity Module (UIM), and a memory card for information storage.

FIG. 3B is a rear perspective view illustrating mobile terminal **100** illustrated in FIG. 3A.

Referring to FIG. 3B, a second camera **121b** may be additionally mounted at a rear surface of the terminal body, namely, the rear case **102**. The second camera **121b** has an image capturing direction, which is substantially opposite to the direction of the first camera unit **121a** (refer to FIG. 3A), and may have a different number of pixels from that of the first camera unit **121a**.

For example, it is preferable that the first camera **121a** has a relatively small number of pixels enough not to cause difficulty when the user captures his or her own face and sends it to the other party during a video call or the like, and the second camera **121b** has a relatively large number of pixels since the user often captures a general object that is not sent immediately. The first and the second camera **121a**, **121b** may be provided in the terminal body in a rotatable and pop-up manner.

A flash **123** and a mirror **124** may be additionally disposed adjacent to the second camera **121b**. The flash **123** illuminates light toward an object when capturing the object with the second camera **121b**. The mirror **124** allows the user to look at his or her own face, or the like, in a reflected way when capturing himself or herself (in a self-portrait mode) by using the second camera **121b**.

A second audio output module **153b** may be additionally disposed at a rear surface of the terminal body. The second audio output module **153b** together with the first audio output module **153a** (refer to FIG. 3A) can implement a stereo function, and may be also used to implement a speaker phone mode during a phone call.

An antenna (not shown) for receiving broadcast signals may be additionally disposed at a lateral surface of the terminal

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nal body in addition to an antenna for making a phone call or the like. The antenna constituting part of the broadcast receiving module **111** (refer to FIG. **1**) may be provided in the terminal body in a retractable manner.

A battery **191** (refer to FIG. **1**) for supplying power to the mobile terminal **100** may be mounted on the terminal body. The battery **191** may be incorporated into the terminal body, or may include a battery **191** configured in a detachable manner on the outward of the terminal body. According to the drawing, it is illustrated that the battery cover **103** is combined with the rear case **102** to cover the battery **191**, thereby restricting the battery **191** from being released and protecting the battery **191** from external shocks and foreign substances.

FIG. **4** is a perspective view of a cover for a mobile terminal that may be coupled to the mobile terminal.

Referring to FIG. **4**, a cover **500** according to an embodiment of the present invention includes a first member **510** and a second member **520**. Also, the cover **500** includes a connection portion **530** connecting the first and second members **510** and **520**. The connection portion **530** may be formed to cover a lateral surface of the mobile terminal **100**, and has a structure of extending in one direction. A form of the connection portion **530** is changed according to a relative movement of the first and second members **510** and **520**.

The first and second members **510** and **520** may have a plate-like shape and be formed to correspond to a front portion and a rear portion of the mobile terminal **100**, respectively. The first and second members **510** and **520** may be made of a material that may be bendable or pliable. For example, the first and second members **510** and **520** and the connection portion **530** may include at least one of polyurethane, PVC, Bakelite, and corrugated cardboard, but materials used to form the first and second members **510** and **520** and the connection portion **530** are not limited thereto.

However the first and second members **510** and **520** are preferably made of a material which is not easily bent and the connection portion **530** between the first and second members **510** and **520** is made of a material which is deformable by force with which the first and second members **510** and **520** relatively move.

According to an embodiment of the present invention, when the mobile terminal is **100** installed in the cover, activation of the display unit **151** is controlled according to a movement of the first member **510**. Hereinafter, a structure of the cover **500** for controlling activation of the display unit **151** of the mobile terminal **100** will be described.

FIGS. **5A** through **5D** are perspective views illustrating operational states of the cover **500** coupled to the mobile terminal. Referring to FIGS. **5A** through **5D**, the second member **520** is installed on a rear surface of the mobile terminal **100**, so the rear surface of the mobile terminal **100** is not exposed. Also, in order to prevent the mobile terminal **100** from being separated from the cover **500**, the second member **520** may have a fixing unit (not shown) for fixing the mobile terminal **100**.

When the cover **500** is installed in the mobile terminal **100**, the second member **520** is fixed to the rear surface of the mobile terminal **100**, and the first member **510** may be formed to cover the display unit **151**. Although not shown in detail, a fixing structure may be formed to connect end portions facing the connection portion **530** of the first and second members **510** and **520** when the mobile terminal **100** is installed.

In a state in which the first member **510** covers the display unit **151**, namely, in a state in which the display unit **151** is not exposed to the outward, the controller **180** may activate the display unit **151**.

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For example, in a state in which the display unit **151** is activated, when the first member **510** covers the display unit **151**, the controller **180** senses the covering of the display unit **151** so it deactivates the display unit **151**.

Thus, the display unit **151** may be prevented from being maintained in an activated state during a pre-set period of time, and thus, power consumption according to activation of the display unit **151** can be reduced.

FIGS. **5B** through **5D** are views illustrating first to fourth embodiments of the mobile terminal **100** installed in the cover **500**. When the first member **510** is moved by the user, the display unit **151** is exposed to the outward. As illustrated in FIG. **5B**, the first member **510** may be bent by the user.

FIG. **5C** is a view illustrating a case in which the first and second members **510** and **520** are opened, exposing a front surface of the display unit **151**. FIG. **5D** is a view illustrating a state in which the first member **510** and the second member **520** overlap with each other, and since the front surface of the display unit **151** is exposed, deformation of the connection portion **530** is maximized.

In the state illustrated in FIGS. **5C** and **5D**, the user generally uses the display unit **151**.

According to an embodiment of the present invention, the first member **510** is spaced apart from a portion or the entire area of the display unit **151** to expose at least a portion of the display unit **151**, the controller **180** activates the display unit **151**. Namely, the controller **180** controls the display unit **151** to output pre-set screen information.

Here, deactivation refers to a state in which power is not applied to the display unit **151** no screen information is output to the display unit **151**. In general, a deactivated state is controlled on the basis of a control command (in general, a control command applied to a power button) applied by the user. Also, activation refers to a state in which power is applied to the display unit **151** and pre-set screen information is output.

The screen information may correspond to a screen which is substantially the same as a screen of a case in which the display unit **151** is activated on the basis of a control command applied by the user to the mobile terminal **100**, but the present invention is not limited thereto. For example, the screen information may correspond to a home screen including at least one icon to which a touch input is applied to execute an application.

Also, although not shown in detail, when a portion or the entirety of the display unit **151** is exposed by the first member **510**, the display unit **151** may be controlled to be activated after a pre-set period of time (a few seconds) has lapsed since a portion or the entirety of the display unit **151** was exposed.

Thus, when the display unit **151** is opened by using the first member, the user may immediately use the activated display unit **151** without having to apply a control command for activating the display unit **151**.

As illustrated in FIGS. **5A** and **5C**, respectively, the controller **180** may control the display unit **151** differently according to a disposition structure of the first member **510** with respect to the body of the mobile terminal **100** and a disposition structure of the first member with respect to the second member **520**.

Hereinafter, a method for controlling the display unit **151** by using the first member **510** and the structure of the first member **510** will be described.

FIGS. **6A** through **6C** are views illustrating the cover for the mobile terminal **100** according to a first embodiment of the present invention.

In FIG. **6A**, (a) is a cross-sectional view taken along line A-A in a first state of FIGS. **5A**, and **6B** is an exploded

perspective illustrating a state in which the body of the mobile terminal **100** is separated from the cover **500** according to the first embodiment of the present invention.

According to the present embodiment, the first state may be defined as a closed state, and third and fourth states may be defined as opened states. Here, however, the second state may be defined as a closed state or opened state on the basis of a user setting.

Referring to FIGS. **6A** and **6B**, the mobile terminal **100** installed in the cover **500** includes the first and second members **510** and **520**, the connection portion **530**, and a signal generating unit for controlling the display unit **151**.

The signal generating unit may detect a state of the first and second members **510** and **520** and generate a state signal to control the display unit **151**. According to the present embodiment, in order to detect a state of the first and second members **510** and **520**, the signal generating unit may further include a deformation sensing film **541**.

The deformation sensing film **541** is integrally formed within the first and second members **510** and **520** and the connection portion **530**. For example, when the cover **500** is configured as a plurality of overlapping members, the deformation sensing film **541** may be formed between the plurality of members.

The deformation sensing film **541** may sense deformation of a portion between the first member **510** and the connection portion **530**, deformation of a portion between the connection portion **530** and the second member **520**, and deformation of the connection portion **530**.

As illustrated in FIG. **6B**, only a region of the deformation sensing film **541** may be formed to overlap with the first and second members **510** and **520** and the connection portion **530**. However, the present invention is not limited thereto and the deformation sensing film **541** may be formed in the entirety of the cover.

The deformation sensing film **541** may be made of a material that generates an electrical signal due to physical deformation. For example, the deformation sensing film **541** may be formed of a piezoelectric film. The piezoelectric film generates a current according to physical pressure. In this case, different amounts of currents and currents of different signs may be generated according to an amount of deformation.

For example, referring to (a) and (b) of FIG. **6A**, the deformation sensing film **541** is disposed such that a section thereof has a channel-like shape. As the first member **510** is moved, a shape of the deformation sensing film **541** is changed to be gently bent. Thus, the deformation sensing film **541** generates a current according to a degree of change in its shape.

Referring to (a) and (c) of FIG. **6A**, the deformation sensing film **541** is bent in different directions and generates currents of mutually opposite signs according to the different directions.

The controller **180** controls the display unit **151** according to a current generated by the deformation sensing film **541**. In order to allow the controller **180** of the mobile terminal **100** to be provided with a current from the deformation sensing film **541**, a first terminal member **542** is formed on the second member **520** of the cover **500**. Also, in order to allow the controller **180** to be provided with a current from the first terminal member **542**, in a case in which the cover **500** and the mobile terminal **100** are combined, a contact protrusion **192** may be formed in one surface of the mobile terminal **100**.

In this case, the second member **520** is installed in the rear case **102** in a state in which the battery cover **103** is separated from the mobile terminal **100**.

Namely, the deformation sensing film **541** may generate a different state signal on the basis of a shape and a degree of

deformation. Namely, the deformation sensing film **541** illustrated in (a) and (b) of FIG. **6A** may generate different amounts of currents having the same sign.

Namely, when a change in the current is sensed based on a pre-set reference threshold, the controller **180** may selectively output a state signal indicating an opened state or a state signal indicating a closed state. According to the present embodiment, the second state may be defined as an opened state or a closed state on the basis of the reference amount of current according to a user setting. When the reference amount of current is set to be small, although only a region of the display unit **151** is exposed, it is defined as an opened state and the display unit **151** may be controlled to be activated. Meanwhile, when the reference amount of current is set as a current variation according to a change from the first state to the third state, the second state may be defined as a closed state.

Although not shown, the display unit **151** may be controlled in a different manner according to a movement of the first member **510**. For example, in the third state, the controller **180** may activate the display unit **151**, and in the fourth state, the controller **180** may control the display unit **151** to change current screen information to a pre-set different screen information (i.e., the controller **180** may control the display unit **151** to display a pre-set different screen information).

FIG. **6C** illustrates the deformation sensing unit **541** connected to a second terminal member **543** according to another embodiment of the present invention.

The deformation sensing unit **541** may be formed to be adjacent to an end portion of the mobile terminal **100** within the cover **500**. The deformation sensing unit **541** is electrically connected to the second terminal member **543** outwardly protruded from the cover **500**.

The second terminal member **543** may be connected to an interface unit (not shown) of the mobile terminal **100** to provide a current. The second terminal member **543** may include a flexible printed circuit board (FPCB) and a wire member.

Thus, a state signal may be generated by using the interface unit for charging the battery **191** without having to separate the battery cover from the body of the mobile terminal **100**.

According to the present embodiment, the display unit **151** may be automatically controlled according to deformation of the cover **500** without a sensing unit within the body of the mobile terminal **100**. Thus, the present invention may be applicable to various types of mobile terminals **100** and efficiency of an inner space of the mobile terminal **100** can be enhanced.

FIGS. **7A** and **7B** are views illustrating the mobile terminal **100** installed in the cover **500** according to another embodiment of the present invention. FIG. **7A** is a perspective view of the mobile terminal in the first and third states, and FIG. **7B** is a partial sectional view of the mobile terminal **100** in the first state.

The cover **500** for a mobile terminal according to the present embodiment may include a sensing unit **550** having a magnet **551** and a hall sensor **552** formed in the first and second members **510** and **520**, respectively. Also, the second member **520** includes a lateral cover portion **521** bent from a section of the second member **520** toward the first member **510**.

The lateral cover portion **521** may be formed to have a pre-set width. Also, the first member **510** may be formed to be larger than a width of the front surface of the mobile terminal **100**, and a corner of the first member **510** may be formed to

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overlap with the lateral cover portion 521. Thus, in the first state, the corner of the first member 510 is supported the lateral cover portion 521.

The sensing unit 550 is formed in a region of the first member 510 whose corner by the lateral cover portion 521. The magnet 551 may be formed to extend along the corner or may be formed in a partial region of the corner. The hall sensor 552 may be formed in a region corresponding to the magnet 551.

The hall sensor 552 senses a change in a magnetic field according to a movement of the first member 510. Namely, when the magnet 551 is away from the hall sensor or approaches the hall sensor 552, the hall sensor 552 senses a change in the position of the magnet 551. According to the change in magnetism, the hall sensor 552 generates a current and provides the generated current to the mobile terminal 100.

Although not shown in detail, the cover 500 may include a terminal member that transmits a signal according to a change in magnetism of the hall sensor 552 to the body of the mobile terminal 100.

According to the present embodiment, when a movement of the first member 510 from the first state to the third state is sensed, the controller 180 of the mobile terminal 100 activates the display unit 151.

Meanwhile, when the movement of the first member 510 from the third state to the first state or to the second state is sensed, the controller 180 may control the display unit 151 to be deactivated.

Since the sensing unit 550 is formed in the cover 500, an additional component is not required within the mobile terminal 100, and since the sensing unit 550 is disposed to be adjacent to the lateral surface of the mobile terminal 100, influence on wireless communication of the mobile terminal 100 can be minimized.

FIG. 8 is a partial cross-sectional view illustrating a cover (500) according to another embodiment of the present invention. The cover according to the present embodiment includes a conductive member 560 that applies a touch input to the display unit 151 (namely, a conductive member that comes into contact with the display unit 151).

The conductive member 560 may be formed in an inner surface of the first member 510 facing the display unit 151. When the conductive member 560 comes into contact with the display unit 151, a value of a current flowing in the display unit 151 is changed. Thus, the controller 180 may generate a state signal according to a change in the current value.

When a region of the display unit 151 with which the conductive member 560 comes into contact is equal to or greater than a pre-set reference region (or when a region of the display unit 151 with which a touch input applied by the conductive member 560 is equal to or greater than the pre-set reference region), the controller 180 may deactivate the display unit 151.

In (a) of FIG. 8, since the conductive member 560 is in contact with the display unit 151, the controller 180 deactivates the display unit 151. In (b) of FIG. 8, when a region of the display unit 151 to which a touch input is applied is equal to or greater than the reference region, the controller 180 activates the display unit 151, and when a region of the display unit 151 to which a touch input is applied is smaller than the reference region, the controller 180 deactivates the display unit 151.

The reference region may be set by the user, and thus, the user may adjust a degree of exposure of the display unit 151 and a point in time at which the display unit 151 is activated.

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Meanwhile, when a portion of a touch input applied to the front surface of the display unit 151 is released, the controller 180 may activate the display unit 151 and may control the display unit 151 to adjust brightness output according to a degree of release of the touch input.

When the entirety of the display unit 151 is exposed by the first member 510, the controller 180 may activate the display unit 151 and control the display unit 151 to adjust brightness thereof.

According to the present embodiment, an additional component for electrically connecting the mobile terminal 100 and the cover to transmit a state signal for controlling the display unit 151 is not necessary, and an additional component installed in the mobile terminal 100 to generate the state signal is unnecessary. Thus the structure of the cover 500 is simplified.

Also, since an amount of light emitted from the display unit 151, as well as an active state of the display unit 151, is adjustable according to a region of a touch input applied to the display unit 151, user convenience can be enhanced.

FIG. 9 is a partial cross-sectional view illustrating the mobile terminal 100 installed in a cover 500 according to another embodiment of the present invention.

According to the present embodiment, the mobile terminal 100 includes a protrusion 193 formed to be pressed in the terminal body. The protrusion 193 moves to the inward of the mobile terminal 100 by physical pressure from the outward, and when the physical pressure is released, the protrusion 193 is moved to outward of the mobile terminal 100.

The protrusion 193 may be formed on a lateral surface of the mobile terminal 100 covered by the connection portion 530. According to a movement of the first member 510, the connection portion 530 is moved and deformed on the basis of the body of the mobile terminal 100.

Also, the connection portion 530 includes a pressing portion 531 formed to correspond to the protrusion 193. The pressing portion 531 may be formed to apply physical pressure to the protrusion 193 or releases pressure applied to the protrusion 193 according to a movement of the connection portion 530. The pressing portion 531 may be made of a material hard enough to press the protrusion 193 to move it. For example, the pressing portion 531 may be made of plastic, silicon, or the like.

For example, referring to (a) and (b) of FIG. 9, in the first state, the protrusion 193 is pressed by the pressing portion 531, so a portion of the protrusion 193 is moved to the inward of the body of the mobile terminal 100. In the first state, the first member 510 covers the display unit 151 and the connection portion 530 covers the lateral surface of the mobile terminal, so the protrusion 193 continuously receives physical pressure applied thereto.

When the first state is switched to the third state according to a movement of the first member 510, the pressure applied to the protrusion 193 by the connection portion 530 is released. Accordingly, the protrusion 193 is moved to outward of the body of the mobile terminal 100.

When the pressure applied to the protrusion 193 is released, the controller 180 generates a state signal. Namely, the controller 180 may activate the display unit 151 on the basis of the state signal.

Meanwhile, when physical pressure applied to the protrusion 193 is continued for more than a pre-set time (a few seconds), the controller 180 may control the display unit 151 to be deactivated. Accordingly, when the mobile terminal 100 is installed in the cover 500 and the first member 510 covers

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the display unit **151**, the display unit **151** can be more quickly controlled to be changed to a deactivated state, reducing power consumption.

According to the present embodiment, since the display unit **151** is controlled by the coupling structure of the cover **500** and the mobile terminal **100**, an additional component electrically connecting the cover **500** and the mobile terminal **100** is not necessary.

FIG. **10** is a partial cross-sectional view illustrating the mobile terminal **100** installed in the cover according to another embodiment of the present invention. According to the present embodiment, the cover **500** includes an identification tag **570** sensed by the short range communication module **114**.

The identification tag **570** may be installed in the first member **510**. When the identification tag **570** is positioned to be close to the short range communication module **114**, the controller **180** senses it and controls the short range communication module **114** to generate a state signal.

The short range communication module **114** according to the present embodiment is formed in a rear portion of the mobile terminal **100**. When the cover **500** is changed from the first state to the fourth state, the short range communication module **114** may recognize the identification tag **570**.

Thus, the identification tag **570** may be formed in a region corresponding to the short range communication module **114** in a state in which the first member **510** is disposed to overlap with the rear surface of the mobile terminal **100**, namely, in the fourth state.

However, the position of the identification tag **570** is not limited thereto. However, preferably, the identification tag **570** may be disposed in a position sensed by the short range communication module **114** only in the fourth state, rather than being sensed by the short range communication module **114** in the first state.

According to the present embodiment, since the short range communication module cannot sense the identification tag **570** in the first to third states, the display unit **151** is controlled to be deactivated. Also, in the fourth state, when the short range communication module **114** and the identification tag **570** are disposed to be adjacent to each other, the short range communication module **114** senses the identification tag **570** and generates a state signal. Thus, the controller **180** activates the display unit **151** on the basis of the state signal.

According to the present embodiment, since the identification tag **570** having a relatively small size is formed within the cover **500** and a component for electrically connecting the cover and the mobile terminal **100** is not necessary, the structure of the cover **500** is simplified.

FIG. **11** is a partial cross-sectional view illustrating the mobile terminal **100** installed in the cover according to another embodiment of the present invention.

The controller **180** according to the present embodiment controls the display unit **151** on the basis of the state signal generated by the proximity sensor **141** that senses an access of the first member **510**. As described above, the proximity sensor **141** is a sensor that detects the presence or absence of an object existing nearby by using the force of electromagnetism or infrared rays without a mechanical contact. Thus, the proximity sensor **141** can recognize the first member **510** although the first member **510** is not in contact with the front surface of the mobile terminal **100**.

The controller **180** may control the display unit **151** according to a state of the first member **510** that approaches the front surface of the mobile terminal **100** or is separated therefrom, sensed by the proximity sensor.

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Namely, in a state in which the first member **510** is continuously sensed by the proximity sensor **141**, when sensing of the first member **510** is released, the controller **180** may activate the display unit **151** on the basis of a state signal generated by the proximity sensor **141**.

Meanwhile, the controller **180** may control the display unit **151** to be deactivated according to a state of the first member **510** sensed by the proximity sensor **141**.

Also, the mobile terminal **100** may further include an illumination sensor (not shown). The illumination sensor may be disposed in the front surface of the mobile terminal **100** and may sense intensity of illumination of the front surface of the mobile terminal **100**.

When intensity of illumination is sensed to be equal to a pre-set intensity of illumination by the illumination sensor, the controller **180** may activate the display unit **151**.

Also, the controller **180** may control the display unit **151** upon receiving signals from the illumination sensor and the proximity sensor **141** simultaneously. The illumination sensor and the proximity sensor **141** may be disposed to be separated from each other. Thus, occurrence of an error that an activated state of the display unit **151** is changed when intensity of illumination of only a portion of the front surface of the mobile terminal **100** is changed or when an object approaches to a portion of the front surface of the mobile terminal, can be prevented.

The mobile terminal according to the embodiments of the present disclosure as described above is not limited in its application of the configurations and methods, but the entirety or a portion of the embodiments can be selectively combined to be configured into various modifications.

As the exemplary embodiments may be implemented in several forms without departing from the characteristics thereof, it should also be understood that the above-described embodiments are not limited by any of the details of the foregoing description, unless otherwise specified, but rather should be construed broadly within its scope as defined in the appended claims. Therefore, various changes and modifications that fall within the scope of the claims, or equivalents of such scope are therefore intended to be embraced by the appended claims.

What is claimed is:

1. A mobile terminal, comprising:

a terminal body comprising first and second surfaces;
a display unit formed on the first surface;

a cover comprising a first member connected to the second surface and a second member that covers the second surface, the first and second members coupled to the terminal body such that the cover and the terminal body are moveable with respect to each other into a closed state in which the display unit is substantially covered by the second member and an open state in which the display unit is at least partially exposed;

a signal generating unit configured to generate a different state signal according to the closed state and the open state of the cover; and

a controller configured to:

activate the display unit in the open state according to the generated state signal;

control the display unit to display first screen information in the open state;

define an overlap state when the first member overlaps the second member; and

control the display unit to display second screen information different from the first screen information in the overlap state.

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2. The mobile terminal of claim 1, wherein the cover further comprises:

a connection portion connecting the first and second members, the connection portion configured to be deformed according to movement of the cover and the terminal body between the open state and the closed state, wherein the signal generating unit comprises a deformation sensing film installed in the connection portion and configured to sense deformation of the connection portion.

3. The mobile terminal of claim 2, wherein:

the deformation sensing film is further configured to provide different currents according to deformation of the connection portion; and

the signal generating unit is further configured to generate the state signal according to the different currents.

4. The mobile terminal of claim 3, wherein:

the signal generating unit is further configured to generate a plurality of state signals according to the different currents; and

the controller is further configured to at least activate or adjust brightness of the display unit according to the plurality of state signals.

5. The mobile terminal of claim 1, wherein the signal generating unit is formed in regions of the first and second members that overlap in the closed state.

6. The mobile terminal of claim 5, wherein the signal generating unit comprises:

a magnet formed in the first member and configured to change magnetism according to movement of the cover and the terminal body between the open state and the closed state; and

a sensor formed in the second member and configured to sense a change in the magnetism.

7. The mobile terminal of claim 6, wherein the cover further comprises:

a terminal member electrically connected to the sensor and configured to transmit a signal to the controller.

8. The mobile terminal of claim 6, wherein the controller is further configured to control activation of the display unit according to the sensed change in the magnetism.

9. The mobile terminal of claim 1, wherein:

the signal generating unit comprises an identification tag installed in the first member; and

the terminal body further comprises a short-range antenna configured to sense the identification tag.

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10. The mobile terminal of claim 9, wherein the signal generating unit is further configured to generate the state signal corresponding to the open state when the tag is sensed by the short-range antenna.

11. The mobile terminal of claim 1, wherein the signal generating unit comprises a conductive member installed in a surface of the first member that faces the display unit, the conductive member configured to change a value of flowing current upon being brought into contact with the display unit.

12. The mobile terminal of claim 11, wherein the controller is further configured to activate the display unit when an area of contact between the conductive member and the display unit is equal to or smaller than a pre-set reference area.

13. The mobile terminal of claim 1, wherein:

the signal generating unit comprises a protrusion formed on an outer surface of the terminal body, the protrusion configured to be pressurized according to movement of the first member; and

the controller is further configured to activate the display unit when the protrusion is released from a pressurized state.

14. The mobile terminal of claim 13, wherein:

the cover further comprises a connection portion connecting the first and second members, the connection portion configured to be deformed according to movement of the cover and the terminal body between the open state and the closed state; and

the connection portion comprises a pressing portion configured to pressurize the protrusion according to deformation of the connection portion.

15. The mobile terminal of claim 1, wherein:

the signal generating unit comprises at least an illumination sensor or a proximity sensor installed within the terminal body;

the illumination sensor is configured to sense a change in intensity of illumination outside the terminal body; and the proximity sensor is configured to sense an object approaching within a pre-set distance of the display unit.

16. The mobile terminal of claim 15, wherein the controller is further configured to activate the display unit when an increase in the intensity of illumination is sensed and no object approaching the display unit is sensed.

17. The mobile terminal of claim 1, wherein the controller is further configured to activate the display unit when a pre-set time has lapsed since the state signal was generated.

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